L/(10-4)

SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES

Vol. XX.—No. 23. [NEW SERIES.]

NEW YORK, MAY 29, 1869

$3 per Annum. [IN ADVANCE.]

A New Style of Velocipede.

The desideratum to which all the efforts of velocipede inventors are now directed, is to make a machine, that, while it can be used on common roadways, will also combine enough amusement with utility to render it desirable. The inventor of the velocipede illustrated and described in this article, has kept both these objects in view, and has produced an entirely unique machine.

It is a bicycle, the wheels of which revolve around a common axis, with crank motions for both hands and feet. The rider sits astride of a saddle-bar in the center of an hexagonal frame from which uprights rise, connected at the top by an adjustable neckyoke. This yoke can be elevated or depressed to suit the stature of the rider. It is fixed to its place by means of spring bolts or catches. The uprights are strengthened by curved braces extending laterally to the axles on either side, which pass through them, and they are attached below to the extremities of the hexagonal frame. To these lateral braces the brakes are attached, so that they can be put on by lowering the elbows, and are provided with springs to take them off the friction wheels on the axles when they are not required. Two rock-bars attached to the inner side of the uprights are connected by short pitmans to the cranks, through which the power of the hands is applied. The cranks, also, receive the power of the feet through stirruped rods. Each wheel being independent of the other, the machine can be readily guided or turned about in a circle of twice its width.

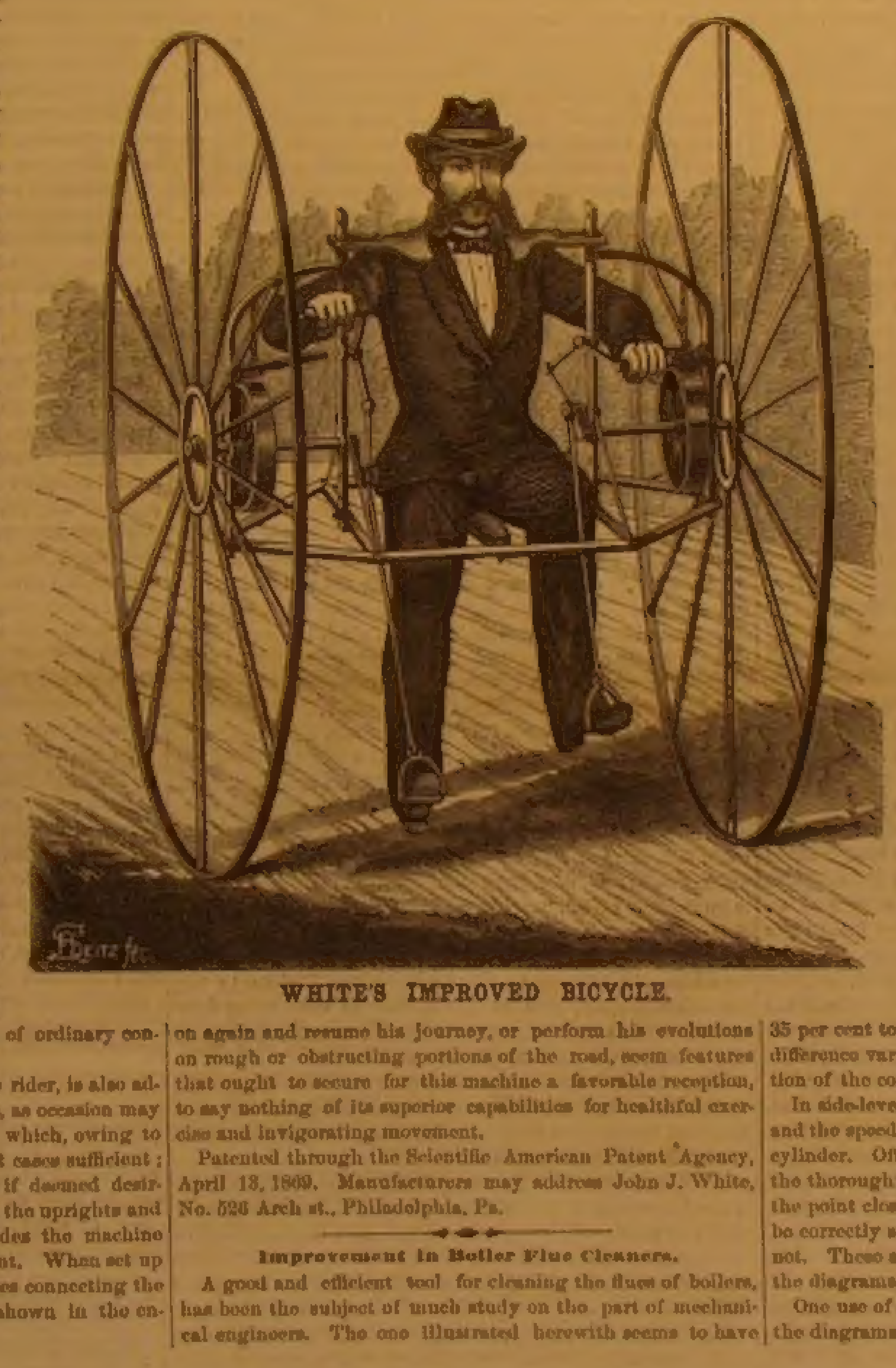
The wheels, for men of ordinary size, are about seven feet in diameter, having rims of steel, with a thick vulcanized rubber band for the tread. The rims are attached by double wire spokes to flanged central disks fixed to the axles. These wires may be interlaced, if thought best, but in either case the wheel is extremely light and elastic. The wires are stretched by means of nuts inside the flanges of the disks.

The perimeters of the wheels are made light and stiffened by corrugation. It may be found necessary to strengthen the wheels against lateral strain, on rough roads, by extending the axles and passing additional wires from the periphery to their extremities. This arrangement secures strength, with lightness and elasticity, but a wheel of ordinary construction may be used if desired.

The hexagonal frame, which supports the rider, is also adjustable on the uprights and lateral braces, as occasion may demand. The saddle-bar may be cushioned, which, owing to the elastic wheels and rims, will be in most cases sufficient; or it may be provided with a spring saddle if deemed desirable. Taking off the hexagonal frame from the uprights and lateral braces and removing the yoke, divides the machine into parts convenient for storage and shipment. When set up and in use, it is stiffened by iron rods or braces connecting the uprights with the corners of the frame, as shown in the engraving.

The saddle bar is swung loosely behind so as to be easily thrown off to the right or left. For ladies, it is proposed to replace the saddle bar by a curved tongue-shaped seat with connecting rods passing around the body on either side, and jointed for the lateral motion necessary to cast them off in front. The levers worked by the hands are for guiding, and to counteract the irregularity of the movements given by the feet; but should it be found desirable, a circular, instead of reciprocating, motion can be substituted by converting, with a few necessary changes, the lever into a winch. As the object is to get the lightest machine possible, the material will, to that end, be of steel, and the bars hollow or corrugated whenever practicable. It is proposed to attach, over their upper ends, a horizontal screen to protect from the sun and rain, likewise a small mirror that may reflect to the eye what is behind on the road.

It will be perceived that, with the fixed fulcrum for the shoulders and back, the whole muscular force of the rider can be exerted, through the legs and arms, to act, by means of the levers above and rods below, on the cranks, or as much on either as is wanted, and therefore, that for both propulsion and guidance he is under favorable conditions, the extensor muscles of all the limbs having the most effective play. As every revolution of the wheels will carry the rider twenty-two feet, his speed must be great on level and descending surfaces, while, from their large curve and elasticity of bearing, a comparatively smooth passage over inequalities is secured. The ease with which, withdrawing his foot from the stirrup, he can reach the ground, throw off the saddle-bar, and walk within his light machine up a hill, then, adjusting it, can slip on again and resume his journey, or perform his evolutions on rough or obstructing portions of the road, seem features that ought to secure for this machine a favorable reception, to say nothing of its superior capabilities for healthful exercise and invigorating movement.



WHITE'S IMPROVED BICYCLE.

Patented through the Scientific American Patent Agency, April 13, 1869. Manufacturers may address John J. White, No. 526 Arch st., Philadelphia, Pa.

◆

Improvement in Boiler Flue Cleaners.

A good and efficient tool for cleaning the flues of boilers, has been the subject of much study on the part of mechanical engineers. The one illustrated herewith seems to have many points of excellence, which will become apparent to practical men upon a description of its structure and operation.

MORSE'S PATENT BOILER SCRAPER.

The letter, A, in the engraving indicates a portion of the handle which passes through a ring, B, forged with and forming a part of the bar, C. The handle, A, after passing through the ring, B, screws firmly into the button, D, which is also forged with the bar, C, and forms a part of it. The point of the bar, C, has a gentle curve toward the longitudinal axis of the handle, A, and the other parts of the instrument, and is also tapered and rounded at the point. To the outside of the bar, C, is riveted the scraper plate, E. This scraper plate, when uncoiled is of rectangular form, having an opening in the center of the plate, of such shape as would be described by the intersection of two equal circles, the object of which is to multiply the cutting edges of the plate. The plate is bent spirally so that two points are in line with the bar, C, and the rivets which fasten the scraping plate to the bar, and the other two points are brought round opposite the bar as shown in the engraving. The handle may be made of gas-pipe, which gives sufficient strength with less weight.

The use of the button, D, is two-fold, *i. e.*, to form an attachment for the handle, A, and also to gather the soot and aid in its removal.

The scraper plate bent in the form, and attached in the manner described has great elasticity and is therefore capable of being inserted readily into flues of different sizes and cleaning them equally well. The curved point of the bar, C, in connection with the inclined edges of the scraping plate, compel the contraction of the latter, in entering flues of small size, while the elasticity of the plate forces its cutting edges firmly against the surface of the flues in the process of cleaning.

We understand these scrapers have made a very favorable impression where they have been tried. This improvement was patented through the Scientific American Patent Agency by M. and C. H. Morse, March 30, 1869. Orders and letters should be addressed to Monroe Morse, Franklin, Mass.

◆

Application of the Indicator.

A new edition of Porter's "Richards' Steam Indicator" is announced by D. Van Nostrand as being in press; revised by F. W. Bacon, M. E., who has made copious notes and additions, as developed by American practice. This revision was needful and will be properly appreciated by the engineering public when the work makes its appearance. An extract from this work gives the following rules for applying the indicator to steam cylinders:

OF ATTACHING THE INDICATOR.—When it is practicable, diagrams should be taken from each end of the cylinder. The assumption commonly made, that, if the valves are set equal, the diagram from one end will be like that from the other, will be shown by this instrument to be erroneous. This is owing to the difference in the speed of the piston at the opposite ends of the cylinder, which is, at the outer end of a direct-acting engine, from 35 per cent to 66 per cent greater than at the crank-end, the difference varying according to the degree of angular vibration of the connecting rod.

In side-lever or beam engines, these proportions are reversed, and the speed of the piston is greater at the upper end of the cylinder. Often, also, there is a difference in the lengths of the thoroughfares, and in the lead, or amount of opening, or the point closing; and many times the valves are supposed to be correctly set, when this indicator will show that they are not. These and many other causes, will make a difference in the diagrams obtained from the opposite sides of the piston.

One use of the indicator is in fact to show whether or not the diagrams from opposite ends of the cylinder are alike.

PIPES TO BE AVOIDED.—The indicator should be fixed close to the cylinder, especially on engines working at high speeds. If pipes must be used, they should not be smaller than half an inch in diameter, and five-eighths in the bends, and as short and direct as possible. Any engineer can satisfy himself with this instrument, that each inch of pipe occasions a perceptible fall of pressure between the engine and the indicator, varying according to its size and number of bends and the speed of the piston. Diagrams have been known to show, from this cause alone, 40 per cent less pressure than was actually in the cylinder. Probably the diagrams taken from engines, generally show in nine cases out of ten, the lead or the pressure or both, untruly, from the incorrect manner in which the instrument is attached.

WHERE TO CONNECT THE INDICATOR.—On vertical cylinders, for the upper end, the indicator cock is usually screwed into the cover. Sometimes it is attached where the oil-cup is set, this being removed for the purpose. For the lower end, it is necessary to drill into the side of the cylinder, at a convenient point in the space between the cylinder bottom and the piston, when on the center, and screw in a short bent

pipe, with a socket on the end to receive the indicator cock. This indicator can be used in a horizontal position, but it will be found much more convenient to put in a bent pipe, and set it vertical. Sometimes it will be necessary to drill in the side of the cylinder at the upper end also, especially in double cylinder engines having parallel motions, when the indicator cannot generally be set on the covers. Care must be taken that the piston does not cover the hole when on the center. No putty is necessary to make these small joints, and it should never be used, as it is liable to clog the instrument. If the screw fits loosely, a few threads of cotton wound around the stem will prevent the escape of steam.

On horizontal engines, the best place for the indicator is on the top or upper side, at each end; if it cannot be placed there, bent pipes may be screwed into the covers or into the side of the cylinder. In other respects follow the directions given for vertical engines. The indicator should never be set to communicate with the thoroughfares. The current of steam past the end of the pipe or the hole reduces the pressure in the instrument, and the diagram given is utterly worthless, as any engineer can readily ascertain by making the experiment.

The stop-cock being screwed firmly in its place, screw the indicator down to its seat, turning it to the most convenient position, and make it fast by turning the coupling; then move the guiding pulleys to their proper position to receive the cord, and the instrument is in readiness for use.

BEET ROOT SUGAR.

No. [illegible]

TECHNOLOGY.—PART VII.

FILTRATION.

"In loading" a filter, the metallic sieve is placed at the bottom of it, through the man-hole, and covered with a wet cloth. A layer of bone black a few inches thick is then carefully spread over the cloth, rammed down tight, and the man-hole door closed. The filter is then filled through the top by emptying the boneblack into it from sacks, until within 18 inches of the top. A coarse cloth fitted into a metallic ring is then spread over the upper surface of the bone black to prevent displacement or the passage of scums, and the cover of the filter tightly fitted on.

New bone black, containing soluble salts, and having a disagreeable flavor must be thoroughly washed before being used for the clarification of saccharine solutions. For this purpose the filter is filled with water (hot if possible), which, at the end of 15 minutes, is run rapidly out by opening the lower cock of the filter to its full extent. Hot water is much preferable to cold for the washing of bone black, as it increases its durability, and at the same time renders it more efficacious in the production of limpid, well-flavored sirups.

Bone black which has been used and "revivified" does not in general need washing before being employed for the filtration of carbonatated juice, but must always be so prepared before filtering sirups through it.

After a certain period of time, which varies according to circumstances, the bone black loses, to a certain extent, its power of purifying juice or sirups; this, for carbonatated juice, is known to have taken place when the filtered juice issues from the filter with a yellowish-brown color and an ammoniacal odor, and for sirups, when they loose their "golden" hue, and acquire an unpleasant flavor. In such cases the flow of saccharine fluid must be stopped, and the filter filled with hot water, which is allowed to run out until it marks from 1° to 1¼° Baumé. The cock is then closed for fifteen minutes, at the expiration of which the liquid is again tested by means of the areometer. If the density has increased the quantity of water used has been insufficient. The bone black, after continued use, finally becomes "spent," after which no amount of hot water, alone, will return to it its clarifying properties.

The operation of filtration must be regular and continuous. If a diminution of the flow at the outlet should occur, this is produced by the obstruction of the meshes of the upper cloth of the filter by dirt, or by scums having agglutinated the upper layers of bone black. In such a case the bone black is taken up to a depth of two feet, replaced by new, and a fresh cloth put over it, when the operation is proceeded with as before.

The quantity received into the filter must always be the same as that which escapes from it, a matter easily regulated by the cocks for egress and ingress. In cases where bad juice or sirups are being worked it often becomes necessary to refilter several times in succession.

The juice from the scum department is run into the same filters as the juice from the carbonatating pans.

When the bone black has become "spent," the filter must be renewed. This is done as follows: In the first place, the upper layer of foul bone black is taken up with a shovel and laid aside; the filter is then emptied of its contents through the lower man-hole, and the lower sieves and cloth taken out. This is only done after the liquid from the filter has been brought by addition of water (after having stopped the flow of juice) to a density of 1° to 1¼° Baumé.

The carbonatated juice is run into the top of a newly-washed filter until the liquid escaping through the bottom marks 1° to 1¼° Baumé. The lower cock is then closed, and the juice allowed to gradually reach the top cock, which must first be opened to one half and later to three-quarters of its extent, but not sufficiently to cause a disturbance of the solid contents of the filter. It is best to receive the juice of only one pan on a filter at one time. This necessitates the use of two filters for every three carbonatating or defecating pans.

The same filters which have been used for clarifying the sirups are employed for the same length of time, for the clarifying of the juice, but filters which have been used for juice must never be used for sirups.

Every time a filter is emptied its internal surface must be washed by dashing hot water into it by the bucket-full, and by rubbing with a wash rag. It is then to be white washed with weak milk of lime by means of a broom. The sieves must also be well scoured and limed.

The filtered carbonatated beet root juice is run from the filters into a *monte-jus*, which carries it to the reservoir of the concentrating vacuum pan; the filtered sirup is run into a *monte-jus*, which carries it to the boiling pan.

BONE BLACK.

This being a very important item in the manufacture of beet root sugar, will detain us a few moments.

The bone black used in this branch of manufacture is the average "grained" bone-black, not the pulverized such as is employed by druggists.

If of a good quality its color is a lusterless black, and it must very strongly adhere to the tongue when applied to it. It must weigh from 42 to 45 lbs. per cubic foot, if heavier it contains water or adulterations. Bone black which has been used once or oftener, and "revivified," has the bluish tint of slate, weighs heavier than new black, and is less porous.

After boneblack has become "spent" it may, to a considerable extent, be restored to a pristine energy, by being submitted to a special treatment, known by the name of "revivification," which we shall now proceed to describe.

After the "spent" bone black has been taken out of the filters, it is thrown in heaps, from whence it is taken to a bone black washing machine, revolving with a speed of 12 to 15 revolutions per minute, and having an incline of about 8 inches, through which runs a constant stream of hot water, which is obtained from the condenser of the vacuum pans. The black issues from this washing machine in an apparently dry state, and is received into baskets placed at its lower extremity, in which it is conveyed to an iron drying floor, heated by the waste heat of the bone-black furnaces. It is here laid in heaps of from one-half to two-thirds of a foot in thickness, and continually stirred both day and night.

When perfectly dry the bone black is placed into high, narrow, vertical iron retorts, placed in a furnace, and heated until these last acquire a peculiar "*brown-red* heat," at which degree the temperature must very carefully be maintained (by the management of dampers) for a period of twenty-five minutes. The contents are then dropped through the bottom of the retorts into portable sheet-iron receivers, or "smotherers," on which a tight-fitting cover is instantly adapted.

The bone black is then wheeled into a shed, through which the air freely circulates, and laid in layers, when it is immediately sprinkled with water from an ordinary watering pot, to exclude the possibility of its reigniting. As soon as the black has cooled down it is ready for use.

The muddy bone black taken from the upper portion of the filters and that which has been several times used is treated differently to what we have just described.

It is placed into wooden tubs, or vats, of a capacity of 200 cubic feet, more or less, and submerged in a mixture of water and muriatic acid, marking 2° Baumé. Effervescence, or as it is improperly called, "fermentation," soon sets in, and is concluded in 6 to 8 days.

The water is now drawn from the "fermented" bone black by means of a tap plug, and the black itself taken to the bone-black washer, from whence it goes to the drying floor and furnace, as before described. In many works the whole of the bone black used is both "fermented" and "roasted."

Bone black is known to be sufficiently washed when water, dripped from it, and placed in a clean tumbler, is perfectly clear and transparent after the deposition of the suspended fine particles has taken place.

The quantity of bone black needed, and the length of time it can be employed before becoming "spent" varies greatly with the nature of the beets and the degree of perfection of the previous defecation and carbonatation. The quantity must be so calculated as to include the quantities in process of revivification as well what is in actual use in the filters.

The average quantity needed, practically, is twenty per cent of the quantity of beets, by weight, worked up every twenty-four hours. A factory consuming 150,000 lbs. of beet root per diem would thus need 30,000 lbs. of bone black.

The residue from the bone-black washer is collected in cisterns where it deposits itself as fine mud, and constitutes a highly valuable fertilizer.

CRYSTALLIZATION.

The beet root sirup boiled to a consistency of from 40 to 42 deg. Baumé, more or less, is distributed into a number of iron forms or crystallizers of a capacity of about 12 gallons each. These are left quiet in an apartment the temperature of which is kept at 95 deg. Fah. At the end of eighteen or 20 hours the upper crust formed is punched through, and in from five to eight days the sugar is "made." If crystallization is progressing favorably, a thin "mirror" soon forms at the surface in the crystallizer, and at a later period this sirup covers to a certain depth the mass of crystallized sugar.

The contents of the forms are next emptied into "centrifugal turbines," revolving drums, the outer surface, of which is covered with metallic tissue through the meshes of which the sirups flow, by the action of the centrifugal force, while the crystals of sugar are retained within. These centrifugals are of various construction, but the velocity of their circumference must not be inferior to from 100 to 180 feet per second.

In a very short space of time the sugar (first product), is ready to be scooped out from the inside of the centrifugals.

If it be desired to make very white sugar, it must be further washed by means of a jet of fine spray or of steam while the turbine is in motion. This washing of the crystals of sugar injures the "grain" to a certain extent, by melting off their sharp angles. The *first* sugar is kept separate from the second and third, being of superior quality. The sirup escaping through the meshes of the centrifugal is received in a *monte jus*, carried to a reservoir, and from thence to the boiling pan, when it is again reduced to a density of 40 to 42 deg. Baumé.

This *second* product is run into iron crystallization tanks of a capacity of 400 gallons each, and kept in a special apartment heated to 100 deg. Fah. In from eleven to fourteen days the *second* sugar is crystallized, when it is "centrifugalized," as was the *first*.

The sirups resulting from these "seconds" are in turn boiled to proper consistency, and collected into iron tanks of a capacity of 1,000 gallons. These are kept in a room at a constant temperature of from 100 to 112 deg. Fah., and from four to six months the "third sugar" is ready for working up.

The residue from the third sugar is *molasses*, and is collected into cisterns for the distiller's use.

After being broken up in a "lump-breaking" machine and passed through a screen the sugar is ready for market.

If the sirups from the *first* and *second* sugars are high colored, they will need clarifying. This is done by adding water to them until they mark from 28 to 30 deg. Baumé, heating by steam to ebullition in an open pan, with full open steam cock, adding half a bucket of ox blood (well beaten up with switches), or, in its absence, white of eggs or milk, and a pint and a half of fine "dust" bone black per thirty-five cubic feet of sirup. The scums are skimmed as they form, and are treated in the same way as the scums of defecation.

The clarified sirup is run through a special filter kept for the express purpose, and is then run into the boiling pans. Sirups from the first, second and third, must never be mixed together.

It is advisable to keep a bucket of cold water constantly in readiness near these boiling sirups during clarifying, so as to instantly allay, at any time, sudden foaming or too violent ebullition and consequent overflowing of the pan.

Estimates for the Bone Black Department of a Beet Root Sugar Factory working 150,000 lbs. of Beets every twenty-four hours.—One bone-black furnace with 2,500 square feet (50 × 50) of drying surface and 14 elliptical retorts, cost, $1,100; bone washer, $110; smotherers, $112. Total, $1,322.

Estimates for Crystallization Department.—Four centrifugal turbines of latest construction, $1,120; sugar crusher, 140; transmission of motion to turbines and crusher, $220; *monte-jus* and gutters, $190; one six-horse power engine running at a speed of 80 revolutions per minute, $380; three reservoirs for sirups of a capacity of 750 gallons, $180; two hundred crystallizers for "firsts," $520; twelve crystallizers for "seconds," $360; eight crystallizers for "thirds" $340. Total for crystallization, in gold, $3,550.

To the above estimates must be added: Piping and cocks for the whole establishment, $3,000; vats, $300; various tools, $1,000; packing and unpacking of machinery, $2,000—beside freight and duties on the whole apparatus, the total weight of which we have estimated to be about 200 tuns.

We have now reached the conclusion of the series of operations by means of which "raw sugar" is made from the beet root. In our next and last article we shall exhibit the amount of labor needed, and give careful estimates of what it would cost to produce beet root sugar in the United States.

For the Scientific American.

STATISTICS OF THE PRODUCTION OF IRON.

(Concluded from page [illegible].)

BY PROF. PETER TUNNER.

Among the non-metallic products of mines salt is the most important. We cannot take notice of its price in those countries where it is a monopoly, as in Austria, but taking its commercial price as a standard, it averages about one florin per cwt. Of less importance are sulphur, vitriol, alum, graphite, manganese, and tungsten, for the cost of which see particulars below. From the unity prices previously discussed, we infer the following values of yearly production:

	Florins.	Florins.
[illegible] cwts. coal @ one-fifth florin	[illegible]	
[illegible] " " @ " " for the manufacture of iron		[illegible]
[illegible] cwts. coal @ one-fifth florin for all other products	140,000,000	
[illegible] cwts. iron @ [illegible] florins		[illegible]
[illegible] mint pounds gold @ [illegible] florins	[illegible]	
[illegible] mint pounds silver @ [illegible] florins	[illegible]	
[illegible] cwts. copper @ [illegible] florins	[illegible]	
[illegible] cwts. lead @ [illegible] florins	[illegible]	
[illegible] cwts. zinc @ [illegible] florins	[illegible]	
All other metals together to the value of	[illegible]	[illegible]
[illegible] cwts. salt @ 1 florin	60,000,000	
[illegible] cwts. sulphur @ [illegible] florins	[illegible]	
Various vitriols and alums	3,000,000	
[illegible] cwts. graphite @ [illegible] florin [illegible] cwts. manganese [illegible] cwts. tungsten	500,000	[illegible]

It appears from this table that the yearly production of iron is represented by the immense sum of 863 million florins, or $431,500,000 gold. This sum exceeds the value of all the other metals, and it is larger than that of the aggregate of all other mineral products. The article next in value is coal, and it may therefore well be maintained that the iron and coal industries represent the two principal departments of human activity in the present age.

The production of the precious metals being chiefly confined to America and Australia, iron receives thereby a much higher importance in European industry than our first table seems to show, in which the productions of all countries of the world are compared with each other. It can, for instance, be proved that the value of the iron production in the Austrian empire is four times as large as that of all other metals; in Germany it is six times as large, etc. But this is not all. The variety of uses to which iron may be applied is surprising

It is employed in the strongest parts of engines as well as in the finest wheels and springs of a watch; in building the mighty iron-clads; in the bulky death-spreading cannon; in the most delicate surgical instrument! It shows its importance when we consider in what proportion its value is enhanced when fashioned into the weighty anchor, the finest fishing-hook, the plowshare, the mower's scythe, or the cambric needle. The values of the precious metals, on the other hand, when leaving the refiners' furnace, differ but little from those of the coined money. While, for instance, the most delicate watch spring is worth a million times more than an equal weight of the steel bar from which it was made, the value of the most elaborated gold or silver article is seldom double the value of the refined metal.

Various articles of daily use have been proposed as indexes of the wealth and civilization of nations. Statisticians and social economists, who have investigated this subject, have arrived at the conclusion that there is no product better adapted for this purpose than iron, and it may be truly held that nearly all branches of human activity are deriving direct or indirect benefit by an increased consumption of this metal.

I have constantly, for thirty years, given attention to the statistics on the diffusion of iron, and I give as follows the results of my investigations:

The yearly average consumption of iron per individual amounts in Great Britain to 100 lbs.; England alone, 150 lbs.; United States of North America, 90 lbs.; Belgium, 70 lbs.; France, 55 lbs.; the German Zollverein, 50 lbs.; Sweden and Norway, 25 lbs.; Switzerland, 22 lbs.; Austria, 20 lbs.; the German part of Austria, 45 lbs.; Italy, 15 lbs.; Russia, 11 lbs.; Spain and Portugal, 10 lbs.; the East Indies (population 180,000,000), 1 lb.

It may be mentioned yet with respect to this table, that England, Belgium, and Sweden appear in too favorable a light, on account of the circumstance that these countries are the only ones which produce larger quantities of iron than they consume themselves, and also because of the fact that the smelting of iron itself requires a comparatively considerable amount of this metal.

Vegetable Electromotors.

The *Chemical News* contains an article contributed by Edwin Smith, M. A., giving results of researches in a field which so far as we are aware has been hitherto untraversed. He says: It is well known that a voltaic combination may be made of two liquids and a metal, if one of the three acts chemically upon one and only one, of the other two; thus—we may employ copper, nitrate of copper, and dilute nitric acid, or platinum, potash, and nitric acid. Connect a platinum crucible with one terminal of a galvanometer, pour in a little solution of caustic potash, place in this the bowl of a tobacco-pipe having the hole stopped up with wax, pour into the bowl a little nitric acid, dip in the acid a small slip of platinum foil, and connect this with the other terminal of the galvanometer; a powerful deflection of the needle indicates the presence of an electric current and shows its direction to be from the alkali to the acid, the platinum serving merely as a conductor. It occurred to me, when performing this experiment, that an electro-motive combination might just as well be made of two vegetable substances, with platinum for conductor, provided only they were of a nature to act chemically upon one another—an alkaloid and an organic acid, for instance. It also seemed to me not unlikely that, wherever two flavors are habitually conjoined in our cookery and eating, the reason why they mutually improve each other is because a certain amount of electric action is set up between the substances employed to produce them. The *rationale* of the right blending of flavors might be found partly, no doubt in chemistry, but partly, also in galvanism.

Pursuing this idea, I tried pairs of eatables which generally go together, such as pepper and salt, coffee and sugar, almonds and raisins, and the like, and found that a voltaic current more or less strong was excited in every instance which I tested. Bitters and sweets, pungents and salts, or bitters and acids, generally appear to furnish true voltaic couples, doubtless in consequence of the mutual action of some alkaloid salt and an acid or its equivalent. As others may like to repeat or extend the experiments, I will describe shortly my mode of procedure: Cut two pieces of platinum foil about 5 inches by 2½ inches, and a number of pieces of filter paper a trifle larger. Well-washed linen is sometimes more convenient than filter paper. Have a small wooden board near the mercury cups of the galvanometer, and let a short copper or platinum wire, dipping into one of the cups, rest on the board. The substances to be tried must be brought to a state of solution, the stronger the better, by infusion, decoction, or otherwise. Suppose coffee and sugar are to be operated upon; solutions of both having been prepared, dip into each a slip of filter paper; place one slip on one of the pieces of platinum foil, and the other on the second piece. Next lay the first slip and its foil on the board, with the metal touching the copper wire before mentioned. Lay the second slip with its platinum upwards, so that the coffee and sugar come into even contact with slight pressure, and immediately connect this upper slip, through a bit of copper wire, insulated from the touch, with the other terminal of the galvanometer. Deflection occurs instantaneously, and may be increased to a considerable vibration by breaking and making circuit at the right swing of the needle. After a few distinct vibrations, it is well to turn over the whole pile of slips just as they are, and connect opposite ends with the galvanometer, so as to reverse the current. This is desirable for the sake of confirming your previous observation, and of correcting any slight disturbing cause arising from the wire and mercury connectors, temperature of the hand, etc. It will be found that coffee and sugar have the same electrical relation to each other as zinc and platinum. Coffee, in fact, is the positive, sugar the negative element. I subjoin a table of the results of numerous experiments, conducted in the manner above described:

ELECTRO-POSITIVE.	ELECTRO-NEGATIVE.
Coffee	Sugar (loaf).
Tea (black)	"
Cocoa	"
Nutmeg	"
Cloves	"
Cinnamon	"
Mace	"
Vanilla	"
Almonds	"
Rhubarb(tincture)	"
Starch	"
Starch caramel	"
Gum caramel	"
Cane sugar caramel	"
Milk sugar	"
Gum	"
Almonds	Raisins
Horseradish	Beetroot
Onion	"
Horseradish	Table salt.
Mustard	"
Pepper (white)	"
Mustard	Tartaric Acid.
Ginger	" "
Cayenne pepper	" "
Pepper (white)	" "
Tea (black)	" "
Tobacco	" "
Quinine (Howard's)	" "
Gentian root	" "
Lemon juice	" "
Horehound	" "
Lavender water	" "
Quassia	" "
Peppermint	" "
Raw potato	Lemon juice.
Rind of Lemon	"
Peruvian bark	"
Camphor (tincture)	"
Laudanum	"
Arnica (tincture)	Dilute Sulphuric Acid.
Peruvian bark	" "
Quinine (Howard's)	" "
Iodine (tincture)	Turpentine.
Caustic potash	"
Starch	"
Starch	Iodine (tincture).
Caustic potash	Neat's-foot oil.

It is somewhat difficult to eliminate from these experiments all error arising from difference of temperature, if the galvanometer is tolerably sensitive. Care must be taken to bring the pair of solutions operated upon to the same temperature before testing them; otherwise a thermo-electric current from the hotter to the colder liquid may affect the needle, and mask the true electrical relation between the two, so far as it depends upon their chemical nature.

ASTROLOGY AND ASTROLOGERS.

To use the rather strong language of a cotemporary, there are still fools who are not only fools, but who seem willing, nay anxious, to spend money to prove themselves so. The advertising columns of the New York dailies contain the proof of this assertion, in the numerous advertisements of fortune tellers, clear-sighted physicians, and astrologers. A very little investigation will convince the incredulous that not only do these imposters make money, but some of them make a good deal of it, by playing upon the credulity of the ignorant and superstitious. The belief that these pretenders have the power to foretell events is not confined to the totally uneducated. Will it be believed, that a lady educated sufficiently to occupy with credit the position of principal of a department in one of our city public schools, did on a recent occasion consult one of these quacks in full faith as to his powers? We know this to be true, and are also possessed of information that clearly proves this superstition to be wide spread, extending even into the higher classes of society.

The following extracts from "Dlecks on Astrology," will show the absurdity of putting any faith in these deceivers, if indeed, anything need be said in this enlightened age of the world upon such a topic.

"Astrology is merely a philosophism, being empirical, wholly visionary, a mere fanciful system compounded of incongruous mixtures of astronomical with human events, of mythology and theology, and of facts with pure fiction. It has been variously designated Judicial, Horary, Atmospherical, and Mundane Astrology. It has also many offshoots subservient to magic or the black art, sorcery, witchcraft, and other pretended mysticisms, ostentatiously styled occult philosophy.

"We may first observe that astrology lays no claim to inspiration, but affects a very ancient unknown origin, tracing back to a dark, heathenish, and superstitious age, in the very infancy of traditional knowledge, when the boldest assertions of the seer [!] were received as the authority of an oracle, no one daring to question their validity. Whatever is remotely possible the astrologer accepts as a fact, while, ignorant of much around him, he assumes with the utmost complacency an intimate acquaintance with the sun and planets thousands upon thousands of miles off; the sun, 807,076 miles in diameter, while he himself inhabits a globe only 7,916 miles in diameter, from which the moon is 238,000 miles distant, and the sun 400 times that distance. The accompanying diagram shows the relative diameters of the planets.

And these immense bodies revolving millions on millions of miles away in immeasurable space, are described by him as fashioning an infant's nose, directing the fortunes or misfortunes of lovers, ordering the property of traders, meting out diseases, and improving or deranging men's mental faculties. And, as if such puerile influences were not sufficiently preposterous, we are informed by the modern seer [!], Zadkiel, that the twelve signs of the Zodiac not only 'rule' the several parts of the human frame, but also those of a ship, as Aries, the bow; Taurus, the cutwater; Gemini, the rudder; Cancer, the bottom; Leo, the upper works; Virgo, the hold; Libra, parts above the water's edge; Scorpio, the seamen's berths; Sagittarius, the seamen; Capricornus, the ends of the vessel; Aquarius, the captain; Pisces, the oars in galleys, the wheels in steam vessels, and the sails in others; but these latter, being above water, we are left in doubt about the ruler of the submerged screw propeller.

"To show what a modicum of learning, and how trifling an acquaintance with matters of natural philosophy will serve the astrologer, we will turn to a modern treatise published in the year 1801, by Francis Barrett (styling himself a student of natural and occult philosophy), a quarto volume of upwards of 370 pages, entitled 'The Magus, or Celestial Intelligencer,' which affords a pretty clear insight into the nature of superstitions which, from an ancient period even to that date, obtained credence, and were popular with the multitude. Treating of the wonders of natural magic, previous to entering on the main topic of his treatise, he adduces a few of what he conceives to be ordinary matters of fact, assuring us that—if any one shall, with an entire new knife, cut asunder a lemon, using words expressive of hatred, contumely, or dislike, against any individual, the absent party, though at an unlimited distance, feels a certain inexpressible and cutting anguish of the heart, together with a cold chilliness, and failure throughout the body; likewise of living animals. If a live pigeon be cut through the heart, it causes the heart of the party intended to be affected with a sudden failure; likewise fear is induced by suspending the magical image of a man [whatever that may be] by a single thread; also, death and destruction by means similar to these; and all these from a fatal and magical sympathy.

"The loadstone, he observes, possesses an eminent medical faculty against many violent and implacable disorders; the back of the loadstone, as it repulses iron also removes gout, swellings, rheum, etc., that is of the nature or quality of iron. Likewise the wearing of the loadstone eases and prevents the cramp and such like disorders and pains.

"The influences of the stars appear to be as intimately known to astrologers as though they had walked among and carefully examined and fully realised their occult properties; for example: In every work observe Mercury, for he is a messenger between the higher gods and the infernal gods; when he goes to the good he increases their goodness; when to the bad, he hath influence on their wickedness. It is an unfortunate sign or planet, when it is by the aspect of Saturn or Mars especially, opposite or quadrant, for these are the aspects of enmity; but a conjunction a trine, and a sextile aspect, are of friendship; but yet, if you do already behold it through a trine, and the planet be received, it is accounted as already conjoined. Now, all planets are afraid [!] of the conjunction of the sun, rejoicing in the trine and sextile aspect thereof.

"They say of the sun and moon; the sun is the lord of all elementary virtues; it disposes [Qy. 'of'] even the very spirit and mind of man. The moon, says Barrett, measures the whole space of the zodiac in the time of twenty-eight days; hence it is that the wise men of the Indians, and most of the ancient astrologers, have granted twenty-eight mansions to the moon, which being fixed in the eighth sphere, do enjoy divers names and properties, from the various signs and stars which are contained in them; through which, while the moon wanders, it obtains many other powers and virtues; but every one of these mansions, according to the opinion of Abraham [? reference], contained 12 degrees, 51 minutes, and also 26 seconds. In the first quarter of these mansions, the first conduces to discords and journeys; the second to the finding [? the hiding also] of treasures, and to the retaining of captives [Zadkiel ought to have been consulted by the Abyssinian Expedition]; the third, to benefit sailors, huntsmen, and alchemists; the fourth, to the destruction and hindrances of buildings, fountains, mills, gold mines, the flight of creeping things, and begets discord; the fifth, to help the return from a journey, the instruction of scholars, and confirms edifices, gives good health and good will; the sixth to hunting and besieging towns and revenge of princes, destroying harvests and fruits, and hinders the operation of the physician; the seventh, to confirm gain and friendship, is profitable to lovers, and destroys magistracies. In a similar manner the remaining three quarters have the characters of their general mansions allotted to them with equal exactness, and, of course, indisputable veracity also.

"We have here a fair example of the arrogant assumptions of ancient, and indeed of all astrologers, magicians, and sorcerers—men who are incompetent to elucidate the ordinary phenomena of nature in the animal or vegetable creation, and yet with unbounded effrontery, affect to build up an empirical system, delivered in a language of their own invention, a pompous parade of jargon made up of the most incomprehensible materials, which, if wholly due to antiquity, partakes of ancient simplicity, credulity, deceit, and superstition; and if somewhat polished and refined to suit the advances of literature and science, has never been able to prove the correctness of its groundwork, or afford a solitary instance of its possessing any meritorious quality beneficial to mankind; while, on

the other hand, its evil consequences have been many, by destroying the peace and happiness of thousands, encouraging deceit, and misapplying in its ignoble pursuit the time and labor and property of its ardent but deluded admirers.

"In Judicial Astrology it is not thought requisite to consider more than a certain number of the planets after a method simplified by ancient astronomers, which is found to be so compact and so complete in governing the destinies of the human race, that modern intelligence has failed to enlarge the field of heavenly influences. Varley notes that the ancients discovered that the circle of the Zodiac, about 16 degrees in width, and through the middle of which runs the Ecliptic, or sun's path through the twelve signs, contains the heavenly bodies, named planets, and the principal fixed stars, and nearly the whole of the material, or significators, from which predictions are obtained. He remarks that, in forming a horoscope this circle is divided into twelve equal parts, corresponding with the spaces containing twelve hours. These twelve divisions are called houses; and they always remain fixed, while the Zodiac, with the twelve signs and all the heavenly bodies belonging to it, are considered to be moving through them all every twenty-four hours. The 'lord' of the ascendant is the planet which rules the signs rising at birth. In drawing horoscopes it is usual to make the figure square instead of round—as below:

"The various significations arising from the aspects of the starry heavens at the time of birth are so exceedingly numerous, that we must refer the curious in such matters to the works themselves, in which all these pretended revelations are minutely recorded. Mankind rank astrologically as being of four temperaments: 1. One class is said to answer to the fiery trigon, also called diurnal, masculine, and choleric, consisting of Aries, Leo, and Sagittarius, which contains the spirited, generous, magnanimous, and princely natures. [Qy. Present example of princes]. 2. We have next the earthy trigon, being nocturnal, feminine, and melancholic, consisting of Taurus, Virgo, and Capricorn, containing the careful, sordid, and penurious qualities. 3. The aërial trigon, which is diurnal, masculine, and sanguine, consisting of Gemini, Libra, and Aquarius, contains the humane harmonies and courteous principles. And 4. The watery trigon, which is nocturnal, feminine, and phlegmatic; namely, Cancer, Scorpio, and Pisces, including the cold, prolific, cautious, and severe qualities. * * * As affecting physiognomy we are assured that—the Scorpio noses are more acquiline than those of Aries, and are more frequently conspicuous for a sort of bracket-shape beneath. * * * the mouth appears in the act of pronouncing the word 'severe.' When we meet in volume after volume with page after page of such composition as this, when we reflect on the sublimity of the heavens and the paltriness of such combinations as are here given of the planets with mundane affairs, we ask the reasons for arriving at such—and of course get a lot of balderdash. Zadkiel, in prefacing a work by Lilly, says: 'If a proposition of any nature be made to any individual, about the result of which he is anxious, and, therefore, uncertain whether to accede to it or not, let him but note the hour and minute when it was first made, and erect a figure of the heavens [see the figure], and his doubts will be instantly resolved. * * * The works claiming to expound this pretended occult philosophy prescribe such childish processes that one naturally wonders how in the midst of so much impudent imposture, astrology and its kindred pursuits ever found or retained any honest partisans. Take for example the use of fumigations, such as of frankincense, etc., to Saturn; of cloves, etc., to Jupiter; of odoriferous woods to Mars; of all gums to the sun; of roses, violets, etc., to Venus; of cinnamon, etc., to Mercury; of the leaves of vegetables to the Moon; of all or any of which there must be a good perfume, odoriferous and precious, in good matters; but in evil ones quite the contrary. The Zodiac is also favorably affected by proper suffumigations. * * * They affect to have suitable bonds by which spirits can be bound, invoked, or cast out. * * * The exorcisms and conjurations of magicians are so audaciously profane and blasphemous as to be unworthy of even a passing notice."

SHAFTING, PULLEYS AND BELTS.

No. III.

Our last article on the above subject, on page 264, left for consideration the balancing of pulleys, laying-out belt holes through floors, running belts at varying angles, and methods of hanging shafting.

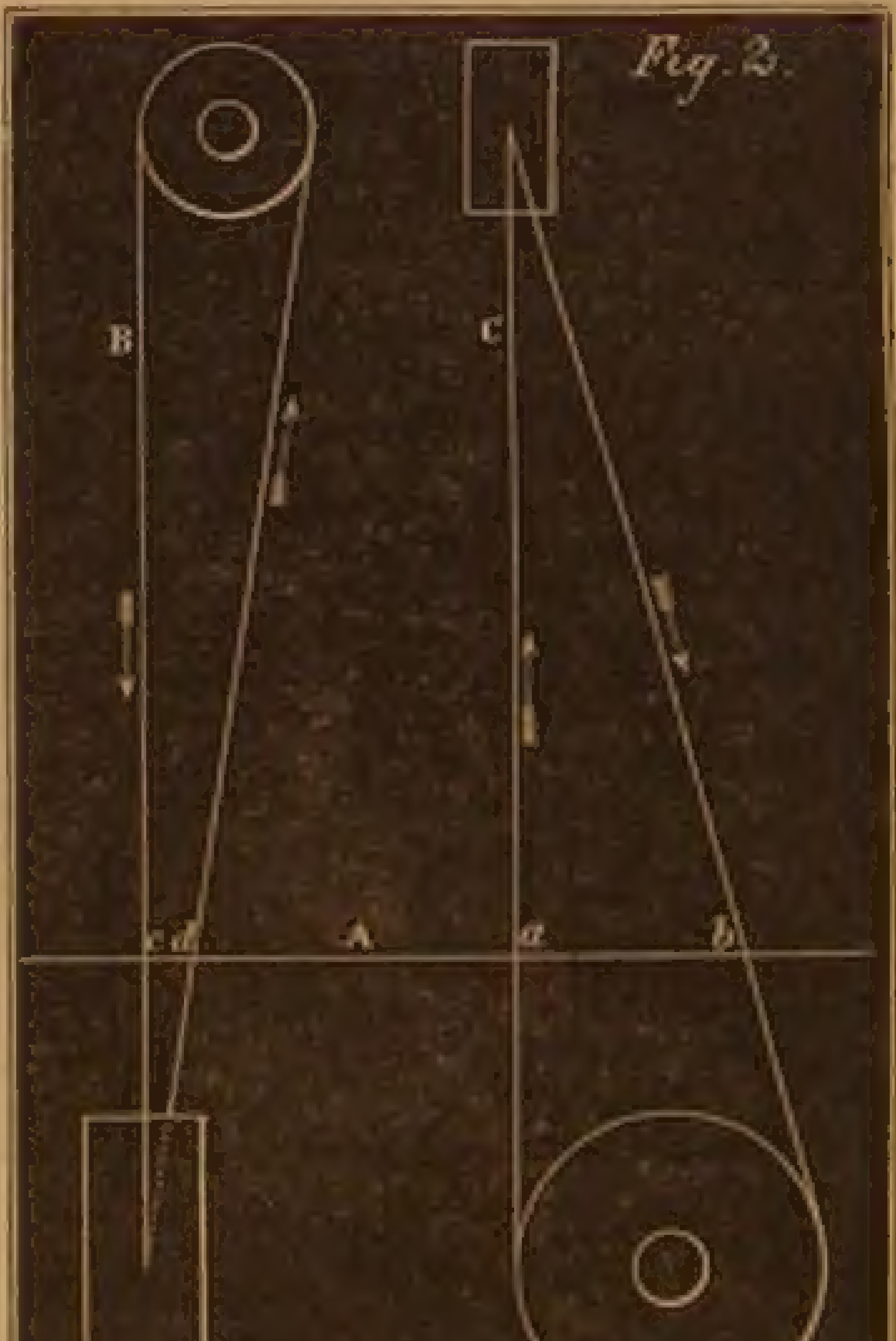
The building into which machinery is to be introduced should be constructed for that especial purpose. This is not always possible, many buildings erected for a different purpose being used for the reception of machinery. Still, it is far better that machinery should go into a building specially adapted to its reception. The walls should be firm enough not to be affected by the jar inevitable in running machinery, the floors should be strong, and the spaces between the beams adapted, as nearly as may be, to the lengths of the sections of shafting, or to the points of support. The main shaft is better supported on a row of columns and running in bracket bearings. In this case the posts are braces connecting at least two floors and thus affording a much stiffer resistance to trembling. But, whether bracket or hanger, the boxes should be adjustable, in order to keep the shaft in line. There are numbers of improved hangers and boxes in the market that answer this requirement, but we shall not designate any one as superior to others. If it should be required to place a hanger between flooring beams, the floor to which it is attached should be strengthened with a generous piece of plank. For securing hangers we think lag screws to be superior to bolts with nuts, where there is sufficient thickness of wood. A wooden straight-edge reaching from one bearing to another is better for leveling hangers and boxes than a twine, which will sag more or less. Some use short cylinders of iron turned to fit the box and having a central hole drilled longitudinally through them. This is an excellent plan, as the eye may sight through, or a string be passed through to determine the level.

Fig. 1.

Where holes are to be bored through the floor close to a wall, post, or other vertical obstruction, a handy tool, similar to that shown in Fig. 1, comes into play: It is easily forged and need not be finished with the elegance of contour our artist has seen fit to give it. A is one of the yokes and B the cross; they are seen united at C. The shank of one yoke has a tapering square hole to receive a bit or auger, and the other is a tapering square shank to fit the stock of the bit-brace. The device is a "universal joint" and can be readily worked at an angle of 45°. (The engraving shows an angle of 90° to exhibit its construction more perfectly).

The method of laying out belt holes through floors to avoid unsightly patches on the floors, occasioned when belt holes are laid out by guess, we published on page 169, Vol. XVIII, but will re-introduce it here. If a belt is to be carried from a pulley on an overhead shaft to one on any floor above, the distance from centre of lower shaft to ceiling—under side of floor—should be measured and noted; then the thickness of floor; next the distance between top of floor and centre of upper shaft. If one pulley or shaft is directly over the other, the size of pulleys and width of belt being known, you have all the data necessary, if you measure the distance of one shaft from the wall of the building, which is done by dropping a plummet from centre of shaft or diameter of pulley and measuring to the wall from that point. From these data, whether the two shafts are in the same vertical plane, whether the diameters of the pulleys are equal, and whether the belt is to be carried through one, two, three, or even four floors, or not, the intelligent mechanic can lay out a diagram that will enable him to cut his belt holes accurately. The diagram may be laid out full size on a swept floor, or on a reduced scale on a board or sheet of paper. Measures thus made can easily be transferred to the floor through which the holes are to be made.

Fig. 2.

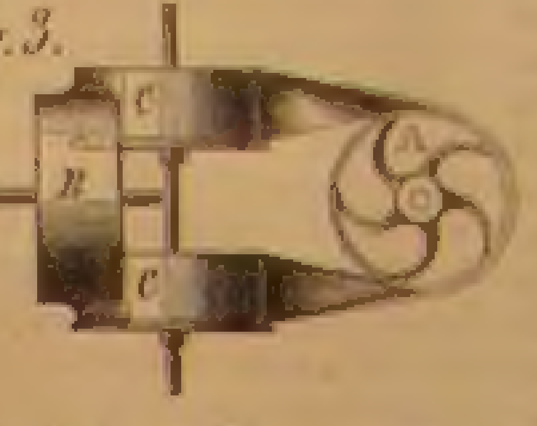


For a "quarter twist" belt we cannot do better than re-publish a diagram (Fig. 2) produced on page 85, Vol. XVIII, with the writer's direction. Lay out on a floor with chalk line and "tram" two views of the pulley, or by scale on paper, as above.

B is the belt running in the direction of the arrow on to the lower pulley, and C is the belt running in the opposite direction. Therefore, drop a plumb line representing the perpendiculars, B and C, and draw the diagonals governed by the diameters of the pulleys, marking the distances *a b* and *c d* on the floor, A. Now drop a plumb line from each side of the centre of face of upper pulley to the floor and from one point *c*, thus found, lay off the distance, *a b*, in a line parallel with the upper shaft, and from the point *a* the distance, *c d*, parallel with the lower shaft. These points are the places at which the holes should be cut.

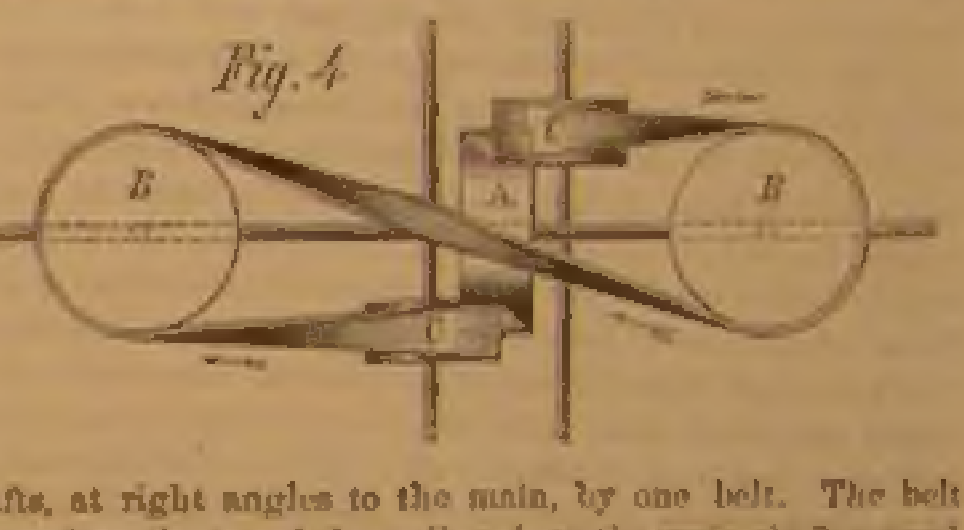
"Quarter turned" or "corner turned" belts are run generally by the device seen in Fig. 3, which represents two shafts placed at right angles, the belt from A or B passing around two flanged pulleys, or guides, C, turning loosely on a fixed upright shaft, and sustained in position by a collar under the hub of each. It is possible to run pulleys by this device which not only have varying diameters, but the shafts of which are on different levels, but the results are not so good, owing to unequal strain on the belt. It is better to confine this method to shafts on the same level and to pulleys of equal diameter, and the useful limit of angle of shafts is that of 45° or less. A greater, or more obtuse angle is better run by means of guides on two uprights.

Fig. 3.



Since the preparation of these papers we have received several communications on this subject, one of which, with the the illustration, Fig. 4, we introduce: The plan is to drive two shafts, at right angles to the main, by one belt. The belt passes from the top of the pulley, A, on the main shaft, around C, to the top of B; then from the bottom of B, around C, to the bottom of A. The shafts of C may turn with the pulleys and be supported in an elegant iron frame. The belt will run either way. W. H. H. Whiting of Chicopee, Mass., is the inventor.

Fig. 4



Another writes that the variations of cone pulleys are not correct, the belt being the tightest on the fast speed, whereas it should be the reverse. The diagram, Fig. 5, will show the reason why and suggest its own remedy. It is only necessary with a pair of dividers to measure from the centres of the pulleys shown by the horizontal lines to the points of contact of the belt, on either pulley, at either distance between shafts. Our correspondent and our intelligent readers generally will readily understand the case from an examination of the diagram.

Fig. 5.

Pulleys may be balanced by swinging them on arbors between lathe centres and noting their positions as their gravity determines it. On the top side drill and tap two holes, in which seat machine screws with flat heads the shanks projecting through from the face or outer side. Then by securing pieces of iron as weights to this point until the pulley is balanced the amount necessary to balance the pulley is found. This amount of lead is then melted and cast in a mold formed by clay. The screws serve to hold the lead in place. Modifications of this plan will suggest themselves to the mechanic.

If set screws are preferred to keys in securing pulleys, it is best to make them of cast steel, with hollow points, the ends beveled to an edge surrounding the hole, and tempered to a dark straw. When set up, these screws cut circular indentations on the shaft and exert an enormous force of resistance. Belts should be run with grain side to the pulley, it being found that they will drive 34 per cent more than with flesh side to the pulley. Pulleys covered with leather, iron pulleys polished, and mahogany pulleys polished, rank for working value as 36, 24, and 25 per cent. respectively, wood and iron uncovered being almost identical.

Bridging the East River, Crossing in an Aerial Car.

The crossing of streams or chasms by means of a sliding car suspended on a rope stretched from either side, is not a new idea. It has been practiced however, heretofore, in a rude and imperfect way. Mr. J. W. Morse, of this city, has considered this principle as capable of a more extended application than has yet been made, and to that end has devised a car and suspension bridge adapted to the transportation of large numbers of people together with teams and their loads, which he thinks specially applicable to transit between New York and Brooklyn over the East River. We give engravings of the elevated suspension way with the car as it would appear midway in its passage over the East River, an elevation of the car drawn to a larger scale, and a front and side of the pulleys, showing their construction.

The construction of the bridge itself, with its cables, towers, braces, etc., is the same in all respects, except weight, as the most approved suspension bridges now in existence, differing only in the mode by which it is proposed to cross it. The cars are to run *under* the superstructure instead of over it—suspended to the track above, in place of resting upon it. The starting points of Morse's bridge will be directly from each bank of the river; the abutments and towers resting upon, and the termini of the route being the wharves on either side. The cars will leave the shores running parallel with the water within a few feet of the surface and land their freight in the same manner, and, if required, at the same place, as the ferry boats do now, only it is thought with much greater facility, carrying large numbers of people and making the transit in one-fourth the time, with greater safety and comfort, and at one-half the expense.

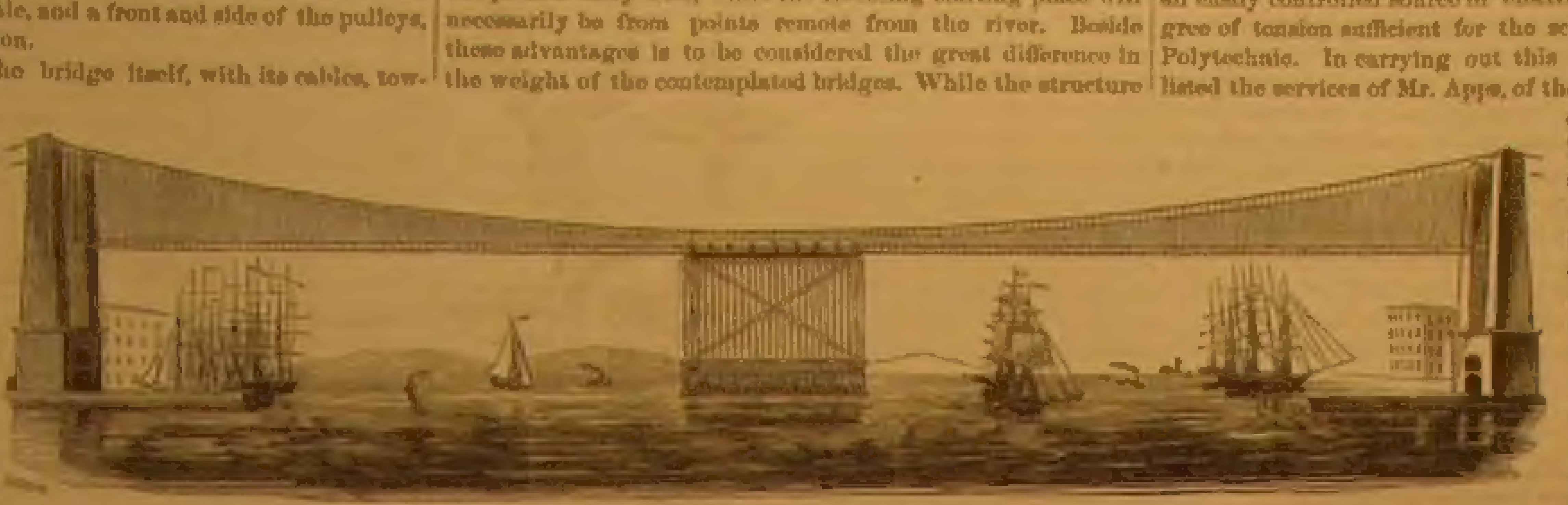
In the construction of this bridge there will be three cables of enormous strength, running from tower to tower, attached to which will be three double steel tracks, 18 inches deep and 4 inches thick, bolted to each side of a beam 12 inches square, the rail projecting upward at the top six inches, upon which double wheels are to run on each side of the tracks. These wheels are of immense strength, supported by strong iron knees and bolted firmly to a platform composed of iron beams suspended close under the tracks. The tracks will be laid at an elevation of 140 feet above the level of the river, so as to allow vessels of any size to pass under them. The car will be suspended below from the platform by means of round steel rods one and a half inches in diameter and of sufficient length. They will be three feet apart, with braces of the same material running transversely from the top corners of the platform to the corners of the car below. The three steel tracks will be suspended from the cables with one and a half inch steel rods, two feet apart, making continuous girders 18 inches deep and 20 inches in width, fastened securely to the abutments at each end.

The car will be 160 feet in length by 40 feet wide and two stories high. The lower story of the car will be exclusively appropriated to horses, carts, cars, and other vehicles, and the upper will be reserved for passengers only. It is estimated that the car will accommodate five thousand passengers at each trip—the passengers and freight leaving the car on one side while others enter at the opposite, thus enabling speedy discharge and loading without confusion. The car is to be drawn across by means of a stationary engine and a wire rope running on friction rollers. The pilot, who is stationed above in the look-out or pilot house, can regulate with his wheel the speed of the car, and with the aid of the telegraph back or stop it as occasion may require.

It is estimated that Morse's suspension car will convey over the East River in the course of twelve hours 75,000 people, beside 5,760 horses and carts, accomplishing as much as nine of the present ferry boats and requiring only two minutes, and even, if necessary, but one minute, to cross the river.

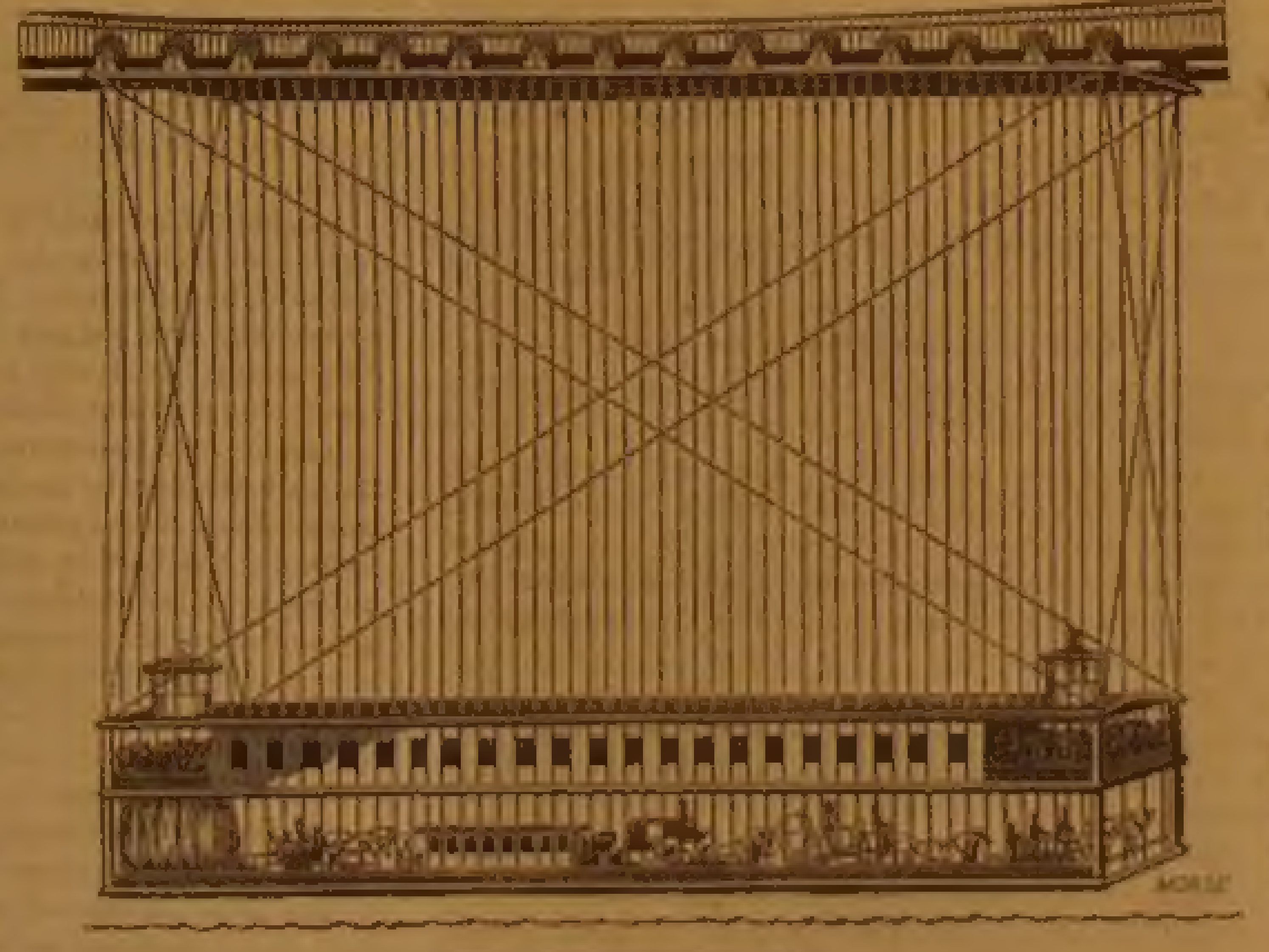
As there will be no necessity for extended abutments to this bridge, as is the case with the Roebling plan, occupying whole streets in New York and Brooklyn at inconvenient distances from the ferry, Morse's plan, beside saving the labor of walking a great distance before getting upon the bridge, will not cost one-third the amount in its construction. It is thought that, when loaded to its utmost capacity with passengers and freight, Morse's suspension track and car will not weigh one-quarter as much as the Roebling bridge without any load upon it at all. It has the advantage of avoiding, by passing under instead of over the bridge, the perils and discomforts of heavy winds and storms to which the other is necessarily exposed at its great altitude.

It is also estimated that the suspension track can be completed and ready for use within one year, and Brooklyn, if she chooses, can own it all herself without recourse to outside stock. The Union Ferry Company say that the Roebling bridge will not affect their interests in the least, as people will prefer taking the chances in the boats rather than be compelled to walk or drive from Chatham Square in New York, to the junction of Main and Fulton streets, in Brooklyn, in all seasons and weathers. Cartmen and working people generally, after a day's toil, will prefer the easy transit from dock to dock, to the journey of a mile and a half over house tops and a high bridge exposed to all inclemencies. By Morse's bridge the crossing may be made in the vicinity of either of the present ferry sites, while the Roebling starting place will necessarily be from points remote from the river. Beside these advantages is to be considered the great difference in the weights of the contemplated bridges. While the structure required for laying the track on Morse's plan is a mere skeleton of comparative lightness, although of great strength, and has an elevation above the river sufficient for the passage of vessels of the largest class, the necessity of flooring, railings, extra beams, etc., in the Roebling bridge adds greatly to its weight. It is calculated that the dead weight of the last named bridge and cable will be 3,483 tuns; the weight of teams and people—say 100,000 per day—will average 1,270 tuns more, making a total weight at any given time during the business part of the day of 4,753 tuns. The hight of the Roebling bridge is only 118 feet and in the center but 130 feet above the surface of the river—not room enough for large vessels to pass under, and near the docks a good sized schooner could not get past. This last mentioned obstacle has called forth remonstrances from various ship owners and masters of vessels interested in the free navigation of the river, and is considered as an objection of the greatest importance, which the adoption of Morse's plan will entirely remove.



MORSE'S SUSPENSION TRACK AND CAR.

We are informed that competent engineers and scientific mechanics have decided that the suspension track and car invented by Morse is stronger and safer, and far less expensive in the construction than any other proposed.



THE SUSPENSION CAR.

Its safety and convenience are thought by the inventor to be far superior to that of the proposed suspension bridge designed by Mr. Roebling.

Having thus fairly stated the views of the advocates of this plan, we think it must be obvious to every reader that there are great objections to it. The concentration of the great weight of the car with the enormous load it is intended to carry upon a limited part of the bridge, instead of its distribution over the entire length, as is the case with ordinary travel, would necessitate greater strength than the ordinary suspension bridge and increase the liability of accidents.

Secondly, we fail to see the advantage in swinging a vessel over a navigable river when it can be so much more easily and cheaply floated across. It is as if one should propose to raise the ferryboats now plying between the two cities and transport them with their loads, high and dry through mid air, in preference to the method of navigation now employed.

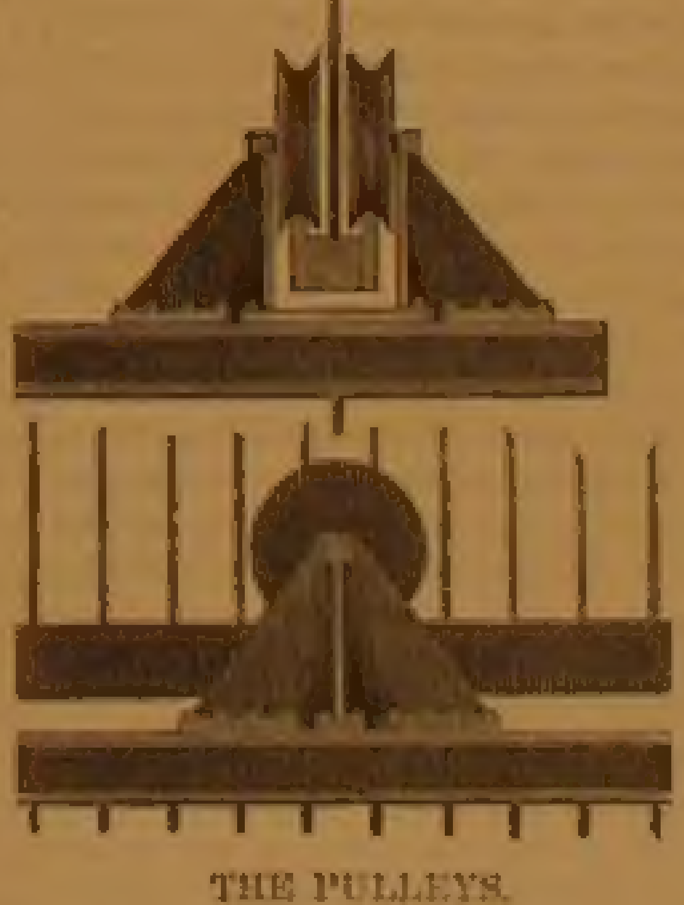
The scheme might however, be applied to the crossing of rapid, dangerous streams, and deep cuts in the neighborhood of mines where it is necessary to transport coal, lumber, and ores across, and on a smaller scale might be perhaps used to advantage under such circumstances. A drawing and model of this device can be seen at Room 22, No. 117 Nassau street New York city.

THE GREAT INDUCTION COIL.

One of the greatest scientific wonders, even in this wonder-producing age, is unquestionably the great induction coil—or inductorium, as the German physicists term it—at the Polytechnic Institution. It is an instrument of remarkable power and capacity, and possesses the highest scientific interest. We briefly described this apparatus three weeks since, but, as a marvel of science, it deserves a more detailed notice than our time then permitted us to give. In designing this induction coil, which is about six times as large as any previous production of the kind, Professor Pepper's object was to obtain an easily controlled source of electricity, combined with a degree of tension sufficient for the scenic requirements of the Polytechnic. In carrying out this object, the Professor enlisted the services of Mr. Apps, of the Strand, who has himself effected many important improvements in induction apparatus, and to whom is due the construction of the present powerful machine; but, although so extremely powerful, it is nevertheless perfectly safe to the manipulator, so carefully has every contingency of accident been guarded against. The machine consists of an ebonite barrel, 9 feet 10 inches in length, supported at each end on two ebonite pillars. The barrel was made at the Silvertown Works, and is the largest ever turned out there. It contains the compound coil, and of itself weighs 477 pounds, the whole machine weighing 15 cwt.

The primary wire is of copper of the highest conductivity 0·0925 inches diameter (B.W.G., No. 13), and 3,770 yards in length; the number of revolutions of the primary wire round the soft iron core is 6,000, its arrangement being three, six, and twelve strands. The total resistance of the primary coil is 2·201400 British Association units; and the resistances of the primary conductors are respectively for the three strands, 0·733800; for the six, 0·366945; for the twelve, 0·1834725 B. A. units. The soft iron core is composed of straight wires of very soft iron, each wire being 5 feet in length, and 0·0625 inches in diameter. The diameter of the bundle of core wires is 4 inches, and their weight 123 pounds. The secondary wire is 150 miles in length, 0·015 inches (B.W.G., No. 29), diameter, and is covered with silk. The total weight of the wire is 606 pounds, and its electrical resistance 33,560 B. A. units. This secondary coil is 4 feet 2 inches long, and the insulation is calculated for safety at 95 per cent beyond absolute requirement. The secondary wire is insulated from the primary by an ebonite tube 8 feet in length, and one-half inch in thickness. The condenser is made with sheets of varnished paper and tinfoil, arranged in six parts, each containing 125 feet super, or a total of 750 feet super.

The machine was originally tried with a contact breaker detached from the great coil, and having an independent electro-magnet; up to ten Bunsen cells with the great inductorium, this worked well, but when the battery was increased to thirty or forty cells it became unmanageable. A Ruhmkorff break, with platinum amalgam and alcohol above it, was substituted, which saved the points, but the spirit was now and then violently ejected and set on fire. Professor Pepper then proposed a modification, which has proved successful, remaining in perfect working order during a series of experiments extending over eight hours. The commutator regulating the admission of the battery current is provided with a locking apparatus, and the whole coil is most carefully and effectually insulated from the floor and surrounding apparatus, as are also the separate portions of the apparatus from each other. The battery power is at present supplied by forty Bunsen cells, each containing a pint of nitric acid. It is, however, intended to substitute for this, a Grove's battery of the largest size ever made, and which is in course of construction. It will consist of pipeclay cells, 2 feet square upon the sides, and 4 inches wide, with walls one-eighth of an inch thick.



THE PULLEYS.

In working the great induction coil, the sparks obtained from it with five Bunsen cells are 12 inches in length; ten cells give sparks 14 inches in length; fifteen cells give 17½-inch sparks; twenty cells give 21-inch sparks; twenty-five cells give 23-inch sparks; thirty cells give 23½-inch sparks; thirty-five cells give 26-inch sparks; forty cells give 27½-inch sparks; and with fifty cells, sparks from 28 inches to 29 inches in length were obtained. After eight hours working, the coil gave, with fifty cells, a spark 25½ inches in length. It was also found that of the proportions of the condenser used, one-half gave the longest spark. The spark is not such as is generally produced under similar circumstances, but is a thick wire of light, surrounded by a wide waving flame 2 inches or

8 inches thick, and which can be blown aside from the spark. The spectroscope gives a perfectly continuous spectrum, like the light of day, only that it is barred with the bright lines of the substances in combustion. The flame of the spark, with a very slight blast of air, rises to, at least, 12 inches in hight when it is passing about the same distance horizontally.

Beside the gigantic Grove's battery, there is also a Leyden battery in course of construction, the present one being inadequate to represent the full power of the coil. The first part of this battery, consisting of 250 feet super of coated glass, is now nearly completed. There is also a very large and elegant arrangement of Gassiott's cascade in course of construction, which is also to work with the great induction machine, and which will embody several important improvements that have been suggested by Mr. Gassiott. The most recent experiments with the coil have shown that as yet no limit as to the quantity effects can be established, and it is exceedingly probable that by a very few minutes' working, the large coil would charge, at least, 1,000 Leyden jars of very large size. The coil, too, is probably destined to throw a new light upon scientific research, and to solve the problem—what is ozone? In reference to the amount of this element, and the density at which it may be produced, very few experiments have as yet been made. But enough is seen in the extraordinary reddening effect of the flame of the spark on litmus paper, to show that we are likely very soon to solve the ozone problem.—*Mechanics' Magazine.*

Creosote as Fuel.

The London *Daily News* says: "For a long time past creosote has been almost a drug in the market, the demand for it for the chief purpose to which it had been previously applied, viz., as a preservative of timber, having almost ceased with the completion of the great railways, and the depression in the railway interest which has of late years prevented the further development of that branch of commercial enterprise. The gas companies have been glad to get rid of it on any terms, and that which had for some years been a valuable refuse of gas manufacture became almost worthless. Its application to heating purposes for which it seems admirably adapted, will, however, probably restore the equilibrium of value which the causes referred to have temporarily disturbed, and at the same time introduce a fuel which, where a very extreme temperature is required, promises largely to supersede the use of coal. At Mr. John Schwartz's sugar refinery in Pelham street, Spitalfields, more than one thousand gallons of creosote oil are daily consumed in heating his two furnaces, which are of one hundred and forty horse-power, and he speaks of it as a most successful experiment. According to his calculation, two hundred and twenty gallons of the oil—the cost of which is one penny a gallon—equal in heating power to two and a half tuns of coals, and one pound of the oil will evaporate thirteen pounds of water, whereas one pound of coal will only evaporate seven pounds of water.

"As a matter of course care is required in the mode of, or rather in the arrangements for using it; but if the directions are followed out, it is not only more economical but more cleanly, and in all respects far less offensive than any other kind of fuel, emitting neither smoke nor smell. Mr. Schwartz's furnaces are supplied from a large tank, from which the creosote flows through a pipe into the furnace, along the sides of which it is propelled by a jet of steam. Coming in contact with the fire (of which there is a small basis in the shape of a red hot coke and brick) it ignites, and burns fiercely with a pure white flame; and the combustion, being perfect, leaves no residuum of any kind. It should be added, as another economical feature in the use of creosote oil, that, as applied to the furnaces in question, no stoking is necessary, consequently stoker's wages are saved; and, again, no expensive apparatus is required to comply with the Smoke Nuisance Prevention Act, since smoke there is none."

Falsetto Voice.

Dr. Marcet, of the Brompton Consumption Hospital, has been looking down the throat of one of the Tyrolese singers who have lately been warbling at St. James' Hall, the object of the inspection being to ascertain the physiological conditions which produce the beautiful falsetto notes for which the Swiss artists are celebrated. The observations were made by means of a laryngoscope, a little instrument whereof the principal member is a mirror placed at the back of the patient's mouth. It is pretty generally known that the human vocal apparatus consists of a pair of membranes situated horizontally in the throat, and just touching at their edges. A drum-head, with a slit across it, may convey a popular idea of them. In the act of singing, the lips of these cords, as they are called, are brought into contact, and they approach each other throughout their whole length, and remain parallel. When they are set in vibration, by the passage of air through them, under these the ordinary conditions, a full chest note is emitted; but if they do not meet in their entire length, either a posterior or anterior portion of them remaining apart, the sound is no longer full, but feeble and shrill; the note emitted is what the stringed instrument player calls an harmonic, and what the singer calls a falsetto, or head note. The violinist who would bring out an harmonic so touches a string that, instead of making it vibrate as a whole, he divides it into segments, each of which vibrates by itself, and emits the note due to its short length, instead of that which the full length of the string would yield. The same sort of thing appears to be done by the falsetto singer; the adept can at will shorten his vocal cords so as to pass instantly from one to its harmonic. The muscular process by which this transition is effected is not clearly made out, so that it cannot be determined whether all singers are alike gifted with powers of head-singing equal to the Tyrolese, or whether Alpine melody grew out of peculiar capabilities of Alpine throats.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

The Advantage of Large Wheels for Vehicles.

Messrs. Editors:—Your correspondent, "J. J. C.," in No. 20, present volume, places himself in a wrong position, inasmuch as he gives us an idea at variance with well known principles, that have been, and easily can be demonstrated. I refer to his law of friction as applied to large cart wheels in comparison with small ones, where he asserts that there would be double the friction on the six-foot wheel that there is on the twelve-foot one.

Of course, we are led to suppose that the load is the same on the axles of both pairs of wheels, and that the load is passing through the same space in a given time. If this supposition is correct he is wrong, and the advantage of the large wheel is not to be attributed to a decrease of friction. It is a well known law that friction *in* and *of* itself is constant, whatever may be the velocity; that is, the resistance caused by the contact of the axle with its circumscribing box or bearing, is the same, whether we have one revolution per minute or one hundred, other causes of resistance remaining the same. For an illustration, take the same cart, with wheels twelve feet in diameter, all weighing 1,200 lbs., moving two miles an hour, ascertain the friction, remove the large wheels and substitute the small ones, and if the weight is the same the friction will be the same if the cart moves at the same speed.

If this law is correct then the advantage of large wheels is not on account of there being less friction, but from another cause which has no relation to it; and this advantage depends on the road, whatever it may be, whether there are obstructions, like stones, sand, mud, or the settling down of the road bed under the wheels, however slight; or, in case of railways, the inequality of the surface of both wheels and rails, and the joints at the head of each rail; or, perhaps, a better and more palpable illustration, the cart passing over cobblestone pavement, or a corduroy road, composed of large round logs. Here, of course, the small wheel falls lower in passing from stone to stone or log to log, than the large wheel, and has to raise the load higher between each, hence as much more power to move the cart at a given speed is required, as the variation in a line described by the axle of the small wheel and that described by a large one, is greater or less when compared with a straight line.

Again, if the large wheel comes in contact with a stone one foot high, it is overcome easier than the small wheel, because the raising the load is not so abrupt—the power is applied longer and through more space—in proportion as the circumference of the large wheel approaches nearer a straight line than that of the small wheel.

Could a perfectly round wheel, with an unyielding surface, rolling on a perfectly smooth unyielding surface be attained, the difference in the size of the wheels would have no effect on the power required to move the cart, everything else being the same.

F. W. B.

Chairs Made from Gas Pipe.

Messrs. Editors.—I see in your last issue, Vol. XX, No. 20, an article headed, "A Chair Wanted," in which you seem to have become disgusted with the articles now used, and the manner in which they are temporarily put together now-a-days with glue only. They seem to last only until they are sold, thereby necessitating another sale soon.

From your experience, one might imagine that you have often been vexed with the rickety concerns. From my experience, I would suggest a good chair or office stool, made of gas pipe.

I am a gasfitter by trade, although at present a clerk in a plumbing establishment. I have had several office stools, all of which, in wear, have resulted in the manner described. I have made a stool myself of small gas pipe, which is nearly as neat in appearance and almost or quite as light in weight as a wooden one, and I defy any man to make fifty wooden stools that will last as long as this one. It is so strong and firm that the weight of twenty men could not break it down. I am a young man, comparatively speaking, and should I live to be seventy-five years old, I feel satisfied this chair, from its strength, would be just as good at the expiration of that time, as it is now. An arm chair may be made as good and comfortable to sit in of the same material (gas pipe).

Nelson Hoyt, Jr.

Easton, Pa.

[We consider the device of our correspondent as a very practical and efficient one, and have no doubt such stools and chairs, for office use, would find ready sale if introduced into the market. Whether they could be made sufficiently elegant for domestic use, may perhaps be questioned, but we see no reason why the principle might not be so extended.—Eds.

To Inventors—Field Cotton Thrashing Machine.

Messrs. Editors:—The great want of the South is a machine for gathering cotton from the field. The negroes work well enough in the cultivation and picking of cotton until the cold weather sets in, then they relax in their labors, and no inducement can be offered that will stimulate them to the unpleasant task of cotton picking with anything like the necessary diligence, so that a large proportion of the late cotton is lost in the field.

Inventors have hitherto endeavored to construct machines that would supply the place of the fingers, and pick the cotton clean and free from trash. This I conceive to be the wrong direction. Let us have a thrasher, or other machine propelled by horse power, that will go into the field (after the frost has swept the stalk clean of leaves and has opened all, or the great majority of the bolls on the stalk), and stradling one or two rows, as the case may be, thrash or beat the stalks and limbs with their bolls all to pieces, delivering the mixed mass of cotton, wool, and trash into a proper receptacle, thence to be conveyed, by attending wagons, to the gin house, there to be cleaned by proper machinery. The leading idea is to get the cotton out of the fields and under shelter, so that it may be cleaned at leisure during the winter months.

I think the cotton can all be recovered from the trash and broken stalks and branches, by the use of a gin called the roller or Parkhurst gin, made in your city previous to the war. What has become of the manufactory since I do not know. This gin carded the cotton very rapidly and efficiently from the seed when mixed with any quantity of limbs, bolls, broken and whole, and all sorts of trash. After purchasing them I ceased the endeavor to pick my cotton clean, but gathered it in the roughest manner, limbs, bolls, anything. The point was to gather it and let the gin cleanse it. It made a better sample with the roughest stock than the ordinary saw gin with the cleanest picked cotton. With this gin a thrasher is practicable, if further manipulation were necessary the other machines used to cleanse cotton in the cotton factories, might be used. That some inventive genius could take hold of this idea and perfect a machine would be conferring the greatest possible benefit upon the cotton interest, and secure to himself princely fortune, I conceive to be by no means an impossibility. I hope some one will try it.

Austin, Miss. H.

Poppies and Opium.

Messrs. Editors:—During the war, a farmer in Middle Georgia, latitude 33° 20', made opium from the common poppies, some had white and others red blooms. The poppies raised in Turkey, for opium, have larger capsules than those usually grown in the Southern States. Both are hardy and easily raised, the seeds falling on the grounds where raised one year and come up the next spring in great abundance. A deep, rich, moist soil is best for the poppy; in dry seasons irrigation would increase the crop. The seeds may be planted at any time in the winter, or early spring—November or December is the best time.

Some of the opium was given to a practicing physician, who made it into laudanum, and used it in his practice. He said it was much stronger than the opium he purchased at the drug stores.

Three feet is wide enough between the rows, with the plants six to ten inches apart. When the blooms drop, the capsules, or seed pods, are cut with a sharp knife, the incisions shallow and perpendicular, and nearly the whole length of the capsules. This operation must be performed near sunset, and while there is enough light to see, to prevent evaporation and desiccation of the opium, and it must be scraped off as early as practicable the next morning, for the same reason. A spoon with sharp edges is a good implement for that purpose. Three or four incisions in each pod is sufficient at one time, equi-distant apart; they may be cut again between the first incisions with like success the second time. Cutting the capsules perpendicularly facilitates the gathering of the opium. The tediousness of slitting and scraping the seed pods will limit the quantity of opium made.

Here is a fine field for the chemist to extract opium, or morphia, at least, from the leaves, stalks, and capsules, as they all contain opium. After the juice that exudes from the pods is scraped off, it is placed in plates in the sunshine to dry, and is worked by hand, before it becomes dry and hard; that is all that is necessary. When dry, it is pure opium. No flower garden can excel a field of poppies in bloom.

W.

Indian Springs, Ga.

A California Chair.

Messrs. Editors:—The chairs answering the demands of the *American Builder*, page 312 Scientific American, current volume, are actually in existence, though apparently known to few only. They were seen not a year ago in California, but their place of manufacture is unknown. All glue is dispensed with, but many years' wear testify to their durability. When seen they were admirably adapted for parlor, dining room, or kitchen; if suitable for office chairs, deponent saith not. Two long and two short, two to two and a half inch turned pieces, with the turned connections, all of firm, sound wood, are firmly held together, while the seat and back are durably and elastically formed by strips of sound raw hide, hair retained. These are all the materials.

R. H.

Does the Resistance Increase as the Square or Cube of the Velocity.

Messrs. Editors:—Having observed several communications under the above heading in the Scientific American, allow me to state a few facts on the subject.

The English iron-clad steamship *Hercules*, when tried at Stokes Bay last January, attained a speed of 14·69 knots with 8,528·75 H.P., and 12·12 knots with 4,014·91 H.P. In this case the power varied as the cube of the velocity, nearly, calculated as follows: $\sqrt[3]{4{,}014·91} : \sqrt[3]{8{,}528·75} :: 12·12 : 15·54$, instead of 14·69, actual speed, the difference being 0·85 knots, which is probably due to the fact that the form of the *Hercules* is a very bad one to be driven at such high speed. The resistance varied as the square of the velocity, thus: With 20 lbs. mean pressure in cylinders, the engines made 71·51 turns per minute, and 55·29 turns with 12·21 lbs pressure.

Now $(71·51)^2 : (55·29)^2 :: 20 : 11·95$; which, subtracted from

12·26, leaves the small difference of 0·31 lbs. I think these facts will settle the question that the resistance to which a vessel is subject varies as the square of the velocity, and the power to produce this velocity varies as the cube of the velocity.

F. E. K.

Mississippi State Fair.

Messrs. Editors:—We thank you for calling attention, in a recent issue, to the State Fair to be held in this city in October next, under the auspices of the Planters, Manufacturers, and Mechanics' Association of Mississippi. We expect, and and shall be delighted to see in attendance manufacturers from the North, East, and West, with machinery, agricultural implements, etc. Our State Fairs, before the "late unpleasantness," were very successful, but our industrial interests, under free labor, are receiving an attention not known to the old order of things. We have the soil, climate, and energy to at least reconstruct our pecuniary affairs, and will be thankful for all the aid received, either through immigration or by the introduction of labor-saving machinery. Persons intending to visit the State Fair are requested to send their address to the undersigned, with a list of the articles they propose placing on exhibition.

J. L. Power, Corresponding Secretary.

Jackson, Miss.

VELOCIPEDE NOTES.

The velocipede having ceased to be a novelty upon our streets and public parks, it has entered the arena of the race course, and we may look for a good deal of exciting amusement. In New York, the warm days of the past month have had no injurious effect upon the veloce-riding fraternity or upon the pastime. In fact the indications are the reverse of what was predicted; for the great sensation has taken a firmer hold than was anticipated upon its devotees.

The first out-door race of the season took place on the Union Course, Long Island, on Tuesday, April 27th, in presence of about five hundred spectators, the assemblage being decidedly the most respectable one seen on the course since the time racing was in the hands of reputable people. The great drawback to the success of the race, was the condition of the track, the sandy dust on the main portion of it lying several inches thick, thus making the track hard for horses and still harder for the bicycle.

The conditions of the first race were: Distance one mile. Not less than four contestants. Driving wheel of each machine not limited in diameter. First prize, gold medal, valued at $150. Second prize, $35 cash. Third prize, $10 cash. Fourth prize, entry fee returned.

The entries for this race included Messrs. Monod, Burroughs, Brooks, Darling, Hill, and Pickering. Pickering was winner of the first prize, the gold medal, and Darling the second, $35.

The conditions of the next race, the third on the programme, were as follows: Distance one mile. Not less than four contestants. Driving wheel not to exceed 36 inches in diameter. First prize—handsome velocipede, valued at $125. Second prize—silver cup, valued at $50. Third prize—$40 in cash. Fourth prize—$10 cash.

The entries for this included Messrs. Martin, Scully, Duryea, Conlan, "Stranger," and Young Carnival; and a good start being effected, a lively and exciting contest took place despite the heavy condition of the track.

The following is the score:

FIRST RACE.

1. W. Pickering, on a 40-inch Pickering machine, Time 5.57
2. Darling—38-inch Monod machine, time 6.05.
3. Hill—41-inch Demarest machine, time 6.10.
4. Burroughs—50-inch Demarest machine, time 6.20.
5. Monod—38-inch Mercer and Monod machine, distanced.
6. Brooks—48-inch Wood machine, distanced.

SECOND RACE.

1. Martin—36-inch Martin & Co. machine, time 6.42.
2. "Carnival"—33-inch Monod machine, time 6.46.
3. Duryea—26-inch Mercer & Stevens machine, time 6.52.
4. "Stranger"—33-inch Merrill & Co. machine, time 6.56.
5. Scully—36-inch Union Co. machine, time 7.06.
6. Conlan—36-inch machine, ruled out for foul riding.

Frank Swift, who is matched against Fred. Hanlon, rode fifty miles recently, at the Oswego rink in 4 hours 17 minutes. This beats Walter Brown's Boston time considerably. He made 750 circuits of the Oswego rink to complete the fifty miles.

No American rider has yet equaled the time made by Moret, a Frenchman, at Carpenteas, France. He was the winner there in a race, distance 1,680 meters (or 1 mile 77 yards), in 2 minutes 40 seconds. He has often accomplished 12 Kilometers (7 miles and 800 yards) in 30 minutes, and 100 kilometers (62 miles and 250 yards) in 7½ hours.

The tropical folks also have a "hankering" after the headless "steed," and during the past week a consignment of velocipedes was shipped to Jamaica, West Indies, from this city. Ward, of Cortlandt street, also sent three to Montevideo, to the proprietor of a public park in that city, who proposes to use them on his grounds, and it is only a few weeks since the Hanlons sent a number to Mexico.

The *Velocipede Messenger*, of Chicago, is responsible for the statement that there has been invented in Pittsburgh, a velocipede of one wheel, which can be propelled by the combined force of five men, who may occupy comfortable seats on the automatic horse. The wheel is ten feet in diameter. Five gentlemen can ride on it as comfortable as in a carriage. It can be propelled at the rate of a mile in two minutes.

A four-wheeled velocipede has been constructed in Buffalo, which will carry a lady, besides the driver, with a carpet bag, etc.

LADY'S VELOCIPEDE DRESS.

"Let the outer dress skirt be made so as to button its entire length in front—the back part should be made to button from the bottom to a point about three-eights of a yard up the skirt. This arrangement does not detract at all from the appearance of an ordinary walking costume. When the wearer wishes to prepare for a drive, she simply loosens two or three of the lower buttons at the front and back, and bringing together the two ends of each side, separately, buttons them in this way around each ankle. This gives a full skirt around each ankle, and, mounted, the dress falls gracefully at each side of the front wheel. A club of six young ladies have taken this velocipede costume under their special care, and declare that if it is not sufficiently perfect, they will soon make it so, as they are bound to be prepared for the track this summer; they practice regularly every morning and are even now good riders."

The country girls, in the East, are practicing "on the sly," with a view to public diversion of themselves and their respective neighborhoods, when the roads are in good condition.

It will not be very surprising if women—or at least the young ones—learn to dress so neatly for this sport and to demean themselves so gracefully on the velocipede as to fairly conquer the prejudices of men into consent to their general adoption of the pastime.

Type-setting and Distributing Machine Wanted.

"It is discreditable to the inventive genius of this country that the one great mechanical want of the time is still unsupplied. Each of the leading newspaper publishers of this city—apart from expenses for white paper, press-work, ink, editorial, reportorial, and correspondents' salaries, and the thousand incidental demands for the production of a great daily—pays from $100,000 to $200,000 a year for composition alone. Publishers, throughout the country, of newspapers, magazines, and books, pay proportionately for this single item of type-setting. This enormous cost prevents the publishers of papers from giving their readers the literal "volumes" of matter they would gladly do from day to day were they not hampered by the delays and the cost of composition. What we want—what every large publisher in the country wants—is a type-setting machine which will both expedite and cheapen the cost of composition at least 25 per cent and perhaps 50 per cent. Type-setting should be so cheap that publishers can print books and papers in this country and sell them at the low prices which obtain, in England. A London house has printed the "Pilgrim's Progress" in clear type, on good paper, so that the book can be retailed for a penny. News and illustrated papers are sold in England at nearly proportionately low rates. We have not, as yet, reached this point of progress in this country, although, in proportion to our population, there are more readers here than in any other nation on the globe. We want the means of supplying the demand for reading matter. The inventive talent of this country produced the steamboat, the cotton-gin, and the electric telegraph. It is fully equal to the production of the perfect type-setting machine which shall rapidly and cheaply do the entire composition of the publishers of the country. Nothing else so profitably suggests itself now to American inventors. We invite the press of the country to join in subscribing for a prize that shall be worthy of the attention and competition of every skilled inventor in the country. This prize should not be less than half a million dollars; and, if the leading publishers in the country can be induced to combine in such an offer, the *World* will gladly head the list with $25,000 as its own subscription. To the successful man who produces the called-for instrument, a quarter million dollars would be gladly given by the publishers of the country. The rest of the prize should be distributed to the second, third, fourth, and fifth best machine, in proper proportion, so that the labor of the inventors may not be thrown away and as an encouragement to every inventor to strive to win the capital prize. Inventors! go to work to-day. The prize will, undoubtedly, be offered. The demand for the type-setter is imperative!"

[We copy the above proposition from the *World*. The want expressed by our cotemporary is, no doubt a serious one. Much, it is true, has been done to meet it, but, at the present moment, there is no machine for setting and distributing type that perfectly fills all the conditions required.—Eds.]

Church Market in New York.

A great many churches have been sold in this city, and in every instant the buyer made a fine thing. Grant Thorburn, that "cannie Scot," who from a penniless nailmaker became a wealthy florist, says that his greatest stroke of luck was purchasing the old meeting-house in Liberty street.

The Dey street church was purchased by a veteran butter merchant, Israel Cook by name, who sold it for mercantile purposes, and thereby made more in a single operation than the profits of hundreds of dairies.

The Garden street (Exchange place) church gave way to the massive structure of the Bank of the State of New York.

The Baptist church in Nassau street passed into the hands of Townsend, the famous sarsaparilla man, who used it as a depot for his quack stuff, after which it went to banking purposes.

The Murray street churches were both sold at auction, and yielded enormous profits to the purchasers.

The Chamber street church next passed away, and its site is now devoted to trade.

The Duane street church, the next in order, was sold at auction for $27,000. In a short time its purchasers sold it for $45,000, and its site is now occupied by an auction house.

The Broadway Tabernacle, which stood ready for the next change, soon went into the market, and the lot is now worth an advance of $100,000.

The Church of the Messiah and the Amity street Baptist Church were both of them lately purchased by A. T. Stewart, in whose hands they have advanced enormously. Their present condition reminds us of Hamlet's pregnant exclamation, "To what base uses may we come at last!" The former is a theater, while the latter is turned into stables for Stewart's horses.

The Dutch church, which is now used as a Post Office, brings $20,000 per annum to the Consistory, and, when the new Post Office shall be finished, the lots on which it stands will sell for $300,000.

The Brick Church afforded a neat operation. It was put into the market in 1854, and with its cemetery (three-fourths of an acre in extent) was sold for $175,000. A year afterward the new owners sold it at auction for $350,000, and the plot at present valuation would be worth a million.

In this catalogue may also be included the Pearl street church, which the bookseller Appleton purchased at a bargain, and also the Broom street church, which the Merchants' Express Company bought for a stable, and were immediately offered $40,000 advance.

To these interesting examples is to be added the recent sale of the Scotch Presbyterian Church (Dr. McElroy's) on Grand street. The congregation having moved up town three years ago, the property, 125x100 feet, was sold for $120,000. It was purchased by the Masonic body with the intention of erecting a hall, but their views changed, and it was sold by them at an advanced of $40,000. Hardly a year has elapsed when it is again put into the market, and brings a further advance of $30,000. With these precedents we are safe in advising any one who wants to get rich to buy a church. The chances are not exhausted. All churches below Union square must go into the market, and in a few years the entire space between that square and the Battery, two miles in extent, will be denuded of all symbols of worship, with perhaps one exception. Mammon will then enjoy an undisturbed reign.

Glycerin for Preserving Natural Colors of Marine Animals.

While collecting on the coast of Maine last summer, I made numerous experiments with glycerin, most of which were eminently satisfactory. At the present time I have a large lot of specimens which have the colors perfectly preserved and nearly as brilliant as in life. Among these are many kinds of crustacea, such as shrimp and prawns, amphipods, and entomostraca; also many species of starfishes, worms, sea-anemones. The starfishes and crustacea are particularly satisfactory. The internal parts are as well preserved as the colors, and in these animals the form is not injured by contraction, as it is apt to be in soft-bodied animals, either by alcohol or gylycerin. The only precaution taken was to use very heavy glycerin, and to keep up the strength by transferring the specimens to new as soon as they had given out water enough to weaken it much, repeating the transfer two or three times, according to the size or number of specimens, or until the water was all removed. The old can be used again for the first bath. In many cases the specimens, especially crustacea, were killed by immersing them for a few minutes in strong alcohol, which adds greatly in the extraction of water, but usually turns the delicate kinds to an opaque, dull white color, but this opacity disappears when they are put in glycerin, and the real colors again appear. Many colors, however, quickly fade or turn red in alcohol, so that such specimens must be put at once into glycerin. Green shades usually turn red almost instantly in alcohol Specimens of various lepidopterous larvæ were also well preserved in the same manner.

The expense is usually regarded as an objection to the use of glycerin. The best and strongest can be bought at about $1 per pound, but recently I have been able to obtain a very dense and colorless article at 42 cents per pound, which is entirely satisfactory. As there is no loss by evaporation, the the specimens will keep when once well preserved, if merely covered by it. The expense for small and medium sized specimens is not much more than for alcohol.—*A. E. Verrill, Yale College.*

Mosquitoes.

The eggs of the Mosquito are laid in a bowl-shaped mass upon the surface of stagnant water by the mother fly. After hatching out they finally become the "wiggle-tails" or wriggling worms that may be seen in the summer in any barrel of water that is exposed to the atmosphere for any length of time. Finally, the "wiggle-tails" come to the surface, and the full-fledged mosquito bursts out of them, at first with very short limp wings, which in a short time grow both in length and in stiffness. The sexes then couple, and the above process is repeated again and again, probably several times in the course of one season. It is a curious fact that the male mosquito, which may be known by its feathered antennæ, is physically incapable of sucking blood. The mosquito is not an unmitigated pest. Although in the winged state the female sucks our blood and disturbs our rest, in the larva state the insect is decidedly beneficial by purifying stagnant water, that would otherwise breed malarial diseases. Linnæus long ago showed that if you place two barrels of stagnant water side by side, neither of them containing any "wiggle-tails" or other living animals, and cover one of them over with gauze, leaving the other one uncovered, so that it will soon become full of "wiggle-tails" hatched out from the eggs deposited by the female mosquito, then the covered barrel will in a few weeks become very offensive, and the uncovered barrel will emit no impure and unsavory vapors.—*Entomologist.*

Austria has 8,000,000 acres of forests, produced by planting. Their value is estimated at several hundred millions of florins.

Improvement in Door Locks.

Security from those marauders who prowl at night, seeking for some easy avenue of entrance to our dwellings, to despoil us of our property, is something in the attainment of which all honest people feel a deep interest. Those devices which have hitherto been considered as affording the greatest security are, for the most part, expensive and complicated. The object sought in the invention herein described and illustrated, is the combination of the catch-bolt and lock, in a cheap and efficient manner, and also to afford security from pick-locks.

The method whereby these objects are attained is shown in the engraving. A represents the outer plate of the lock, which is shown with the inner plate removed. B is the lock-bolt, to which is attached a guard bar, D, having a longitudinal slot in its forward part, which receives a stop, C, formed upon the the bolt, B. The forward and backward movement of this bar is limited by a projection, E, on the bolt, B, which enters notches formed on the lower edge of the bar. The rear or inner end of the guard-bar is held down by a spring attached to the bolt, B, as shown in the engraving. A thumb-piece, F, is pivoted to the rear or inner end of the bolt, B, and passes out through the side of the outside plate, A, serving to move the bolt when released from the operation of the dog, G, as will hereafter be shown. A wire connects the forward end of the bolt, B, with a second thumb-piece, H, at the top of the outside plate, A. The dog, G, is drawn into the vertical position by a coiled spring, and is made to resume the position shown in the dotted outline by the notched bar and thumb piece, I, pivoted to the lower end of the dog, G, and passing through the outside plate, A, upon which it catches when the coiled spring has drawn it into the position shown in the engraving. When the dog, G, has been pushed by the bar, I, into the position shown by the dotted outline, it is held in that position by raising the thumb-piece, H, which, by its wire attachment, raises the bolt, B,—shown in the engraving as shot out, and fastened by the shoulder, P, on its under side,—to the level indicated by the horizontal dotted line in the engraving. The thumb-piece, F, then serves to draw back the bolt and unlock it.

The dog, G, acts upon the under side of a second dog, J pivoted to the catch bolt, K, which, when raised to the position shown in the engraving, locks the catch-bolt by abutting against a stud, L, attached to the outside plate, A, and passing through a slot in the catch-bolt. When the dog, G, is pushed back into the position shown by the dotted outline, the dog, J, also drops into the position shown by the dotted outline below it, and the catch-bolt is unlocked. The catch-bolt, K, differs in nothing else, materially, from the catch-bolts in common use. M is the post to which the inside plate is screwed as in ordinary locks.

Having thus described the parts of the lock, we will describe its operation, which will also include a description of the key. The bolt being shot out and locked in the engraving, we will proceed to unlock it. We first lift up the bar, I, to release it from the outside plate, A, and press it inward until the dog, G, has reached the position shown by the dotted outline; then raise the thumb-piece, H, which raises the bolt, B, to the level shown by the horizontal dotted line in the engraving; we can now shoot back the bolt by the aid of the thumb-piece, F.

Both bolts are now unlocked, but as it is convenient to use the bolt, B, independently of the catch bolt, K, and also independently of the dog, G, or, in other words, to use it like an ordinary lock, provision is made for this requirement. In order to accomplish this, the key is provided with a ward, O, on the opposite side from the ward which locks and unlocks the bolt. Presuming that the bolt, B, is unlocked in the manner above described, the guard bar, D, remaining in the same relative position with reference to the bolt, B, as shown in the engraving, the notch, N, would be brought directly over the keyhole. This notch is so cut as to form an inclined plane, against which the rounded surface of the ward, O, presses when the key is pushed into the lock. This pressure raises the guard-bar, D, so as to release it from the projection, E, on the bolt, B. A quarter revolution to the right slides the guard-bar along until the end remote from the key meets the shoulder of the bolt at P, making a continuous plane between the points, P and Q, which will remain continuous until the guard-bar is again raised, as the projection, E, engages again with the guard-bar, by the notch next to the one with which it was it was held at first, as shown in the engraving. The guard-bar cannot be thus raised except by an entire revolution of the key backward, which unlocks the bolt and places the key in position to be withdrawn. The key being now taken from the lock, the bolt can be shot and both it and the catch-bolt securely fastened by simply pushing forward the thumb-piece, F, the parts then occupying the position shown in the engraving.

When thus locked no amount of picking at the keyhole will avail to unlock it, as the keyhole is closed by the dropping of the bolt. The key itself will not unlock it until the proper adjustment of the parts by the use of the thumb-pieces is effected.

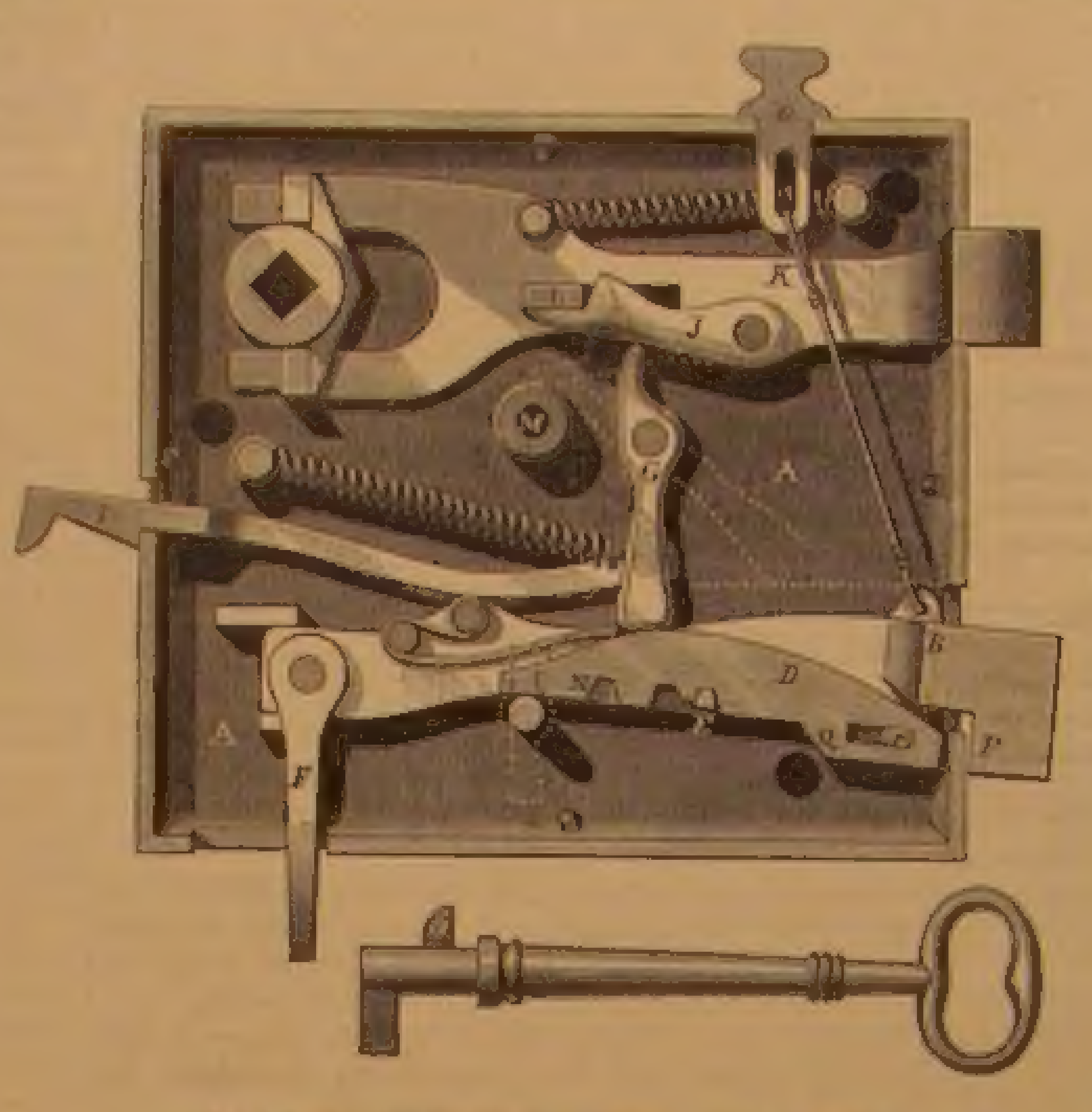
The combination of the several elements of this device to perform the complex movements required is very simple, and, we think, not likely to get out of repair. It can be used with a night key by first shooting the bolt with the key, then carrying it back by the thumb-piece, F, when it can be unlocked at pleasure from the inside, and remains always open to the night key from the outside.

This lock was patented through the Scientific American Patent Agency, April 20, 1869, by D. V. Miller, of Weedsport, N. Y., and has been assigned to Miller & Kiernan, of the same place, whom address for further information. A limited amount of territory will be disposed of.

◆

How to Select a Clothes Wringer.

In purchasing a clothes wringer we prefer one with cog-wheels, as they greatly relieve the rubber rolls from strain that would otherwise occur, and add much to the durability of the machine. The next point is to see that the cog-wheels are so arranged as not to fly apart when a large article is passing between the rollers. It matters not whether the cog-wheels are on one end or both ends of the shaft, if large articles disconnect them, they are entirely useless. This is very important, for the larger the article, the greater the strain; therefore, if the cog wheels separate so as to disconnect, they they are of no service when most needed. We have taken some pains to examine the various wringers, and much prefer the "Universal," as lately improved, because it has long and strong gears (Rowell's Patent Double Gear), and is the only wringer with "patent stop" for preventing the cog-wheels from separating so far as to lose their power.—*New England Farmer.*



MILLER'S COMBINED BOLT AND LOCK.

[Having used for many months the kind of wringer mentioned above, we fully indorse all that is said of it by our New England cotemporary.—Eds.

◆

Improvement in Prop Blocks for Buggy Tops.

All persons who have ridden in carriages, the tops of which are constructed in the ordinary manner, must have observed, and have been annoyed by the jar arising from throwing the top back, and also by the bumping which takes place, in going over a rough roadway, between the bows and the hitherto rigid and inelastic prop block.

STICKEL'S IMPROVED PROP BLOCK.

The invention, which we here illustrate, is designed to obviate these annoyances, and to give immunity from the wear upon the top, consequent upon the constant friction between it and its support when thrown back. It consists in making the bearing surfaces of the prop block of india-rubber, the construction of which is shown in Figs. 1 and 2 in the engraving. Fig. 1 represents a segment of a cylinder of rubber, dovetailed to fit into the prop block, which is made of the form shown in Fig. 2. This improved block is shown attached to the skeleton of a buggy top, in Fig. 3. The device is so simple, it is surprising that it was not earlier thought of. The advantages claimed for it are obvious. The inventor will dispose of the entire right for the United States, or will give the right to manufacture on a royalty.

This device was patented through the Scientific American Patent Agency, July 30, 1867, by W. H. Stickel, whom address at Dayton, Ohio, Postoffice box No. 400. Whole patent for sale.

◆

Meteorology.

Meteorology has of late years made great progress in France, so far at least as regards the organization of a regular system of observation. This, it must be allowed, is in a great measure due to the enlightened exertions of Mr. Duruy, the Minister of Public Instruction, who, in 1864, provided all the primary normal schools with good instruments, and recommended the pupils to keep registers of barometrical and thermometrical readings, the fall of rain, the state of the weather, etc. The system is now in full of activity at all those establishments, where observations are now taken every three hours between 6 A. M. and 9 P. M.; but at seventeen of these schools also at midnight and 3 o'clock A. M. The average annual temperature is obtained by eight observations daily. As for the barometrical observations, they have been turned to good account, in obtaining forecasts of the weather, according to Admiral Fitzroy's system, which has been adopted and improved in France.

The barometrical readings registered at the normal schools are of great public importance, as every storm announces its proximity by a considerable depression. Nor do these readings stand alone; they are combined with hygrometrical observations, testing for manifestations of ozone, etc. Nothing is omitted, and at the end of each year the loose leaves on which the various data have been registered, are made up into books. Here again there is a decided improvement; that of 1865 only comprising the path of common storms and hurricanes, while that of 1866 also gives the zones visited by hail storms, and special remarks on the climate of France, and that of 1867 contains a fourth part, consisting of various papers and documents on the general results obtained. The latter are peculiarly interesting; from them we learn that the storms visiting France chiefly come from the Atlantic, with the exception of local ones engendered by the winds of the Mediterranean, when they skim the declivities of the south-eastern coast. Another remarkable result is this: that hail is produced by two clouds, one above the other, with a considerable distance intervening between them. These clouds cross each other at a certain angle; a noise is then heard like the rumbling of a cart, and is immediately followed by a shower of hail. With the straitened means at his disposal, Mr. Duruy has done wonders, and he may well be proud of the result.

◆

Wooden Pavement.

In San Francisco they are using a wooden pavement, the blocks being sawed in such shape that when laid down they will occupy a position in which the grain of the wood, instead of being vertical, will lie in an inclined position, with V-shaped grooves or recesses arranged between their upper portions, and filled with gravel unmixed with asphaltum, or other waterproof or binding substance, this last being considered unnecessary. The grooves or recesses are caused to break joints, and are, of course, designed to facilitate the foothold of horses passing over the pavement. It is claimed that by this plan of laying the blocks the latter are caused to mutually sustain each other, that their surfaces are less subject to being battered and abraded by iron-shod hoofs and the tires of wagon wheels, and that the expansion of the blocks consequent on the absorption of moisture, instead of causing the pavement to "arch," will simply make each block slide slightly upon the inclined surface of its neighbor. The blocks employed in the experiments thus far made with this kind of pavement, have been subjected to a preservative process, in which the pores of the wood are filled with sulphates of lime and iron. The Nicolson pavement is now being laid in several of the cross streets of that city, and gives great relief from noise and jar. The citizens generally appear to like it.

◆

How to "True" a Corundum Wheel.

W. E. Driscoll, of Bedford, Ind., writes to the *Dental Cosmos* as follows: "Presuming that many have been annoyed in getting corundum wheels to run true, or to give them an even surface when rough, each indispensable in making good joints, I offer the following suggestion: The wheel being adjusted to the lathe, revolve it very fast, holding a piece of corundum stone against the uneven or wabbling surface, and in a short time you will find the piece melting and uniting with the wheel, so as to make it perfectly true in all respects."

◆

Invention is calculation, not discovery.

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

☞ "The American News Company," Agents, 121 Nassau street, New York.
☞ "The New York News Company," 8 Spruce street.

☞ Messrs. Sampson, Low, Son & Marston, Booksellers, Crown Building, 188 Fleet street, London, are the Agents to receive European subscriptions. Orders sent to them will be promptly attended to.

☞ A. Asher & Co., 20 Unter den Linden, Berlin, are Agents for the German States.

☞ Trubner & Co., 60 Paternoster Row, London, are also Agents to receive subscriptions.

VOL. XX., No. 23...[New Series]....*Twenty-fourth Year.*

NEW YORK, SATURDAY, MAY 29, 1869.

Contents:

(Illustrated articles are marked with an asterisk.)

ANCIENT AND MODERN WONDERS.

The "seven wonders" of the world, or the seven historical monuments of the constructive skill, and magnificent art of the ancients are: First, "The Great Pyramid of Egypt," which, according to Herodotus, was built by Cheops, King of Egypt, about 900 years before Christ. Pliny says that 360,000 men were employed 20 years in building this pyramid, and that 12,760 million pounds of granite were used in its construction. Second, "Babylon the Great, the Lady of the Kingdoms, the Glory of the Whole Earth." The same historian states that the walls of the city were sixty miles in circumference, built of large bricks cemented with bitumen and raised around the city in the form of a square, protected on the outside by a ditch lined with the same material. They were 87 feet thick and 350 feet high. The city was entered by 25 gates on each side, of solid brass, and strengthened by 250 towers. The outer walls surrounding the palace of Nebuchadnezzar were six miles in extent, and the hanging gardens were so high that they overtopped the walls of the city. Third, "The Gold and Ivory Statue of Jupiter Olympus," done by Phidias, the greatest artist that ever lived. The god was formed of gold and ivory, 58 feet high, seated on a throne, and almost touching the roof of the building. According to Strabo the workmanship must have been exquisite. Phidias embodied Homer's impersonation of the god:

> "He spoke, and awful bends his sable brows,
> Shakes his ambrosial curls, and gives the nod,
> The stamp of fate, and sanction of the god.
> High heaven with trembling the dread signal took
> And all Olympus to the center shook."

The artist inquired of Jupiter himself if he was satisfied, and the approval was given by a flash of lightning which struck the pavement of the temple.

Fourth, "The Temple of Diana of the Ephesians" at Ephesus. The temple was built of cedar, cypress, and even gold, and within it were treasures, offerings to the goddess, of works of art, the value of which almost exceeded computation. Praxiteles, the celebrated Greek sculptor carved the altar, and during a period of two hundred and twenty years, the whole of Asia Minor assisted in enriching the structure. Nero robbed it, however, of much of its valuable treasures. As an architectural work it was doubtless brought near to a state of perfection.

Fifth, "The Mausoleum, or Tomb of Mausolus," erected at Halicarnassus, B.C. 353. It was nearly square in plan, 118 by 93 feet, having around its base a peristyle of 36 Doric columns 60 feet high, while the superstructure rose in a pyramidal form to the hight of 100 feet. It was very richly adorned with sculpture by Greek masters, but it is very likely that the tomb of Mausolus was inferior to that of Napoleon in Paris.

Sixth, "The Pharos of Alexandria," an ancient lighthouse consisting of several stories and galleries of prodigious hight, with a lantern on the top continually burning. It was built to subserve a useful purpose by one of the Ptolemies, and was so famous that all lighthouses after it were called by the common name of Pharos. The ancient Pharos was 450 feet high, and several Arab historians mention a telescopic mirror of metal which was placed on its summit and used to burn the vessels of enemies, by directing it so as to concentrate the rays of the sun upon them.

Seventh, "The Colossus of Rhodes," described as a giant figure 105 feet high, placed across the harbor of Rhodes, with a stride of fifty feet from rock to rock; vessels passed under it in full sail. A lamp blazed in its right hand. An internal spiral staircase led to its summit, and around its neck was suspended a glass in which ships might be discerned as far off as the Egyptian coast. It was an object of worship, but was thrown down by an earthquake, 224 B.C., fifty-six years after its completion.

It will be observed, that with the exception of the ancient "Pharos," not one of the seven wonders of the world possessed any intrinsic utility.

We might easily, however, point to seven modern wonders of the world, greater as works of skill than those of the ancients, which are not merely objects for wide-eyed admiration, but are daily and hourly benefiting the entire race. The modern system of land and marine steam transportation, of which the Pacific Railroad just completed is the most prominent example on land, and our magnificent and staunch ocean steamers the greatest triumph of man over the sea; the electric telegraph, which has annihilated time in communication between the remotest parts of the earth; the modern suspension bridges, under which the Colossus might have walked without stooping or knocking his hat off; our immense tunnels, through which the iron horse plunges heedless of the mountain which engulfs it; our steam hammer, so ponderous in weight, so delicate in its action; our spinning jennies and mules whereby a single person can spin a thousand threads with greater ease than the ancient matrons could spin one; our modern printing press, which preserves the thought of the entire world as a rich inheritance for future ages; our—but we have already our seven modern wonders of utility and we might easily name seventy. All the glory, all the barbaric magnificence of the ages recorded in history, could not, if compressed into a single epoch, equal those of the century we now live in—a century which is regarded by many as one in which utilitarianism has degraded man's æsthetical nature. Let those who will, sigh that the world goes backward. They think so only because the standpoint from which they look at progress makes the direction of events seem reversed.

◆

KID GLOVE ENGINEERING.

We hear a general complaint that the professions of mechanical and civil engineering are becoming more and more unreliable as avocations; that there is not work enough for those now in the ranks, while the schools are pouring out a constant stream of young men to clamor for a share of such business as offers, and thus overcrowding professions, the members of which are already too numerous.

The real trouble is that these professions, like those of law and medicine, are filled with quacks, who, by an outside show of learning, obtain business which they are not entitled to, and which they are incompetent to adequately perform. Pecksniff's who employ "Tom Pinches" to do work for which they take the credit, are more common in these professions than might generally be credited. Men who by pomposity of manner and diction, lead outsiders to place trust in their knowledge, while their real ignorance and incompetency are concealed under the veil of silence. Our readers will recollect the rustic wisdom of the father who told his son to say nothing and no one would suspect him to be a fool.

There are many who write C.E. and M.E. after their names, whose only ability consists in skillfully pilfering the designs of others, and copying their drawings and specifications; and as those who employ engineers are to a great degree incompetent to pass upon their merits or demerits, such pseudo-engineers are enabled to secure business which ought to fall into the hands of more competent men.

The only protection that can be secured against these parasites is in proper association, admission to which should only be possible to accomplished and competent men. The associations which now exist are not sufficiently mindful of the public good which they might accomplish, by discountenancing those who are not up to a reasonable standard of qualification and the self-protection which would result from such a course. Their primary object seems too often to be merely existence as associations, and any one who is willing to pay fees and dues, is welcomed as so much permanent income without reference to other considerations.

That our assertions as to the extent of incompetency which prevails is correct, is corroborated by the numerous engineering abortions scattered everywhere throughout the country. One need not go out of New York to find them, and he cannot miss seeing them, go where he will within the limits where public works can be found.

Another thing, which in our opinion is injuring more especially the profession of mechanical engineering, is, that the schools are turning out a set of men puffed up with the foolish conceit that because they have studied books they are finished engineers. No greater mistake can be made, and the failures of such men reflect dishonor upon the entire profession.

The graduate, kid-gloved and perfumed, who has studied perhaps with sufficient thoroughness the chemistry of iron working, finds himself put to the blush by the practical knowledge of a smutty-faced puddler, or, as in a case we lately knew, that in setting a steam valve on a portable engine by pure computation, he becomes the laughing stock of an entire establishment, for omitting to take into account the effects of expansion upon the boiler.

"A cat in gloves catches no mice" is as true of mechanical engineers as of cats, and when we find sound theory and good sense in connection with hands that are hard and black, or that have in their day been hard and black at the forge, the lathe, and the vice, we find a man who knows his business, and can build machines, pictures of which he has never seen in a book.

QUALITATIVE ANALYSIS.

It is often a matter of wonder to those unversed in chemical science, how the ingredients of the most complex mixtures and compounds can be determined. A quantity of soil is sent to the analytical chemist, and, in a short time, he is able from his examination to not only state definitely the names of all the elementary substances it contains, but their quantity, and the peculiar combinations in which they are present. A person dies from supposed poisoning. Portions of the stomach and its contents, with the lungs, liver, or other viscera, are placed in the hands of the analyst, who quickly traces out the poison, if it be present, ascertains its nature, and whether it is present in quantity sufficient to cause death, and does this with such certainty that he can testify in a court of law, to the presence of the poison, as positively as though he had seen it go down the throat of the deceased. Even mathematical operations give no greater certainty than the expert chemist derives from his results.

In this article we shall attempt to give our readers a glimpse of the principles which underlie qualitative analysis; premising that it is a subject difficult to treat in a popular manner, and deferring for some future occasion the subject of quantitative analysis, or the determination of the quantities of the different substances present in a given mixture or compound.

Qualitative analysis, as its name implies, is a separation of a mixture or compound into its components. The separation may be immediately followed by recombination into new substances, and in fact this combination is one of the means whereby the analyst determines the separation of an ingredient and therefore infers its presence.

Qualitative analysis comprises investigations made to ascertain the presence of a certain substance or of a number of specified substances, as well as investigations made to determine all the substances contained in a compound.

The determination of the presence or absence of a single substance in a solution is a comparatively simple matter, but when it is necessary to determine the nature of all the substances present in a mixture of elements or compounds the problem becomes a complicated one, and its solution must be sought upon the assumption that all known substances *may* be present.

The operations in analytical chemistry depend upon the general principle that like causes always produce the same effects. The analyst proceeds by bringing into contact known substances with those which are to be determined, under prescribed conditions, the effects of which upon the reaction have become known to him by experience. The nature of the reactions which invariably take place upon such contact, are also known to him by experience; in fact, experience is the foundation of knowledge with him, and the study of books is only a guide to him in getting experience during his days of pupilage. No chemist's testimony would be admitted in a court of justice not based upon experimental knowledge. From this it will be seen that analysis cannot be pursued by formulæ, like the preparation of subscriptions in an apothecary's shop. Such formulæ are useful in learning the art of analysis, but their truth must have been demonstrated in the experience of the chemist before they are available for actual work.

To illustrate the above statement we will suppose a chemist to have gone through with the preliminary work of the analysis of a stomach to detect the presence of strychnia, by the process called the "Rogers and Girdwood's method," and to have reached the final test. This test is as follows, according to "Fresenius:" If a few drops of concentrated sulphuric acid be added to a little strychnia in a porcelain dish, solution ensues without coloration of the fluid. If, now, small quantities of an oxidizing agent be added, as solid chromate of potash, the fluid strikes a beautiful blue-violet color. The assertion of this fact, even by so good an authority as "Fresenius," would not authorize any chemist to swear to it as a fact; his own experience would.

The analyst therefore, taught by experience, can positively assert, that under certain limiting circumstances, if a substance sought be present the addition of certain other substances, will always produce certain results, which, if they occur, are a direct proof of its presence. The reagents selected as tests will be such as produce distinct and unmistakable reactions, such as are not produced except when the substance sought is present.

To illustrate this point let us suppose a liquid under examination for salts of ammonia. The analyst knows by his previous experience that if salts of ammonia are in the liquid, the addition of hydrate of lime will decompose them, when the ammonia will be freed and exhibit its characteristic odor. It will also restore the blue of litmus, previously reddened by acids, and will form white fumes of chloride of ammonium when brought into contact with the vapors of hydrochloric or acetic acid. From these facts he infers that ammonia is present, and that it is in a state of combination, as if anything more than an extremely small quantity of free ammonia were at first present, the peculiar smell of this substance would be perceptible before the addition of the lime. For the detection of extremely minute traces of ammonia chloride of mercury is an extremely delicate test. It produces a white turbidity in solutions which contain only ·00005 of their weight of this gas.

The reader will now see that in qualitative analysis, which has for its objects to detect the presence of substances without regard to quantity, it is not necessary that the entire substance under examination should be separated into its elements, but that correct inferences in regard to their character can be made from the reactions which take place when other reagents are added, or when certain physical changes, as fusion, solution, ignition, etc., are effected.

Thus bodies may disappear in the process of solution so entirely that the microscope is impotent to detect them, to reappear when some other substance is added, to disappear again upon the addition of still another reagent, and so on *ad infinitum*. The deadly poison, which secretes itself in food or drink, is swallowed, and performs its work of death, reappears again in the test tube of the analyst to bear witness against the homicide. So great certainty attends the detection of poison that fewer homicides escape the punishment of their crimes when accomplished by such means than when death is procured by violence. The time was before the science of chemistry had made its present advances, when people might be deprived of life by subtle poisons with little fear that its presence could be determined and when symptoms were the only evidence of poisoning. But that time has passed and modern science is now a very sleuth-hound on the track of those who attempt to take human life in this manner.

MUSICAL INTERVALS.

The present musical scale, to which all modern musical instruments are attuned, has been made the subject of study by eminent scientific men, among whom Helmholz may be said to be the most prominent. Tyndall, in his lectures on sound, touches very lightly upon this topic. He defines a musical sound to be one which "is produced by sonorous shocks which follow each other at regular intervals with a sufficient rapidity of succession." The octave of any tone is produced by double the number of vibrations which produce that tone. The division of the interval of the octave into intervals including five tones and two semitones makes the modern diatonic scale. If the whole of this scale be divided into semitones, we have the chromatic scale of twelve semitones.

The discussion of this subject has lately been quite prominent. Several papers have been read upon it before the French Academy. M M. A. Cornu and E. Mercadier have expressed the opinion that a single musical scale will not satisfy all conditions. They affirm that the intervals in a scale of melody are not precisely the same as in a scale of harmony. They remark that sounds that are pleasing in succession as melodies, are not necessarily pleasing when superposed as harmonics, and we may even be astonished that the intervals, hitherto considered the most perfect, as the octave, the fifth, and fourth, do not satisfy both conditions.

The ear detects faulty intonation in melody much more readily than in harmony, unless the volume of tone be subdued. Musical composers avail themselves of imperfect chords in passages where large volume of sound is employed, and powerful organs cover up discords that would be intolerable in instruments of less power.

The subject is beset with many difficulties. The instruments, which have been constructed with a view to remedy the defects of those which require what is called temperament in tuning, have never become popular. They have required too complex mechanism, and new systems of notation and fingering.

We believe that the maxim, "let well enough alone," may aptly apply to those who are engaged in the discussion of this subject. Are not the instruments we now possess sufficiently accurate in their intonation to satisfy the refined ear? We think they are, and that in this respect they had better be let alone.

There is little doubt that instruments may be devised that would add to the resources of the orchestra, and that there is still room for improvement in the action of such instruments as require a keyboard as well as in other respects. There is also room for improvement in the mechanism of brass instruments, especially those known as valve instruments; but we think an attempt to reach any further refinement of intonation unnecessary and impracticable.

PROGRESS IN THE ART OF CASTING METALS.

Immense as have been the advances in all kinds of mechanical work during the last half century, it is quite doubtful whether any other department has more to boast of than the art of casting metals. Readers not yet on the downhill of life can recollect the clumsy, rough-surfaced castings which thirty years since formed the best work the founderies could then produce. Now the finish and lightness of hollow ware, stove castings, etc., leave little to be desired.

Since that period the application of this art to architectural purposes, has grown into a vast industry. The casting of stoves has also developed a trade of great proportions. There is scarcely a town in the United States large enough to find a place in a general map of the country that has not its foundery, where job work of all kinds, stoves, plows, and other agricultural implements are made.

But progress in this art is not confined to the increase in the amount of work done, but is none the less remarkable in the methods of doing the work. It would be difficult to devise a form so complex that an experienced founder would hesitate to undertake it. We, not long since, had occasion to have a peculiar form of pattern executed in a brass foundery and model shop. It was apparently so difficult to make, that though it was desirable to have it cast for the sake of economical manufacture, we consulted the foreman of the shop—a first-class mechanic—in regard to the practicability of constructing patterns that could be molded. His reply was, "If you consider it desirable to cast this piece in its present form, *it must be cast so*."

"But can you cast it so?"

"It is many years since anything has been brought to this shop that we could not cast, and we don't intend to have such an event occur now. Let us make the patterns and we will make the casting."

The piece was cast to our entire satisfaction.

It is within our recollection that the casting of iron cylinders with brass linings has been introduced, a process now successfully practiced in casting pump barrels, and cylinders for other hydraulic machines. Within that time also malleable castings have been brought nearly to perfection. We were shown a few days since a quantity of small castings, said to have been made of a species of steel, which had been heated and hammered and bent and twisted, in a manner that showed they were in no respect inferior to forgings in strength and malleability. These castings were made in Scotland. We also saw lately a specimen of skill in molding and casting brass, being nothing less than a continuous chain with hooks at each end, which had, as a curiosity been made by a skillful pattern maker and molder.

Neither must we omit to mention the perfection to which the casting of statuary, both of iron and bronze, has been brought. Some of these are models of artistic beauty, both in design and finish. The casting of small articles of malleable metal, is also largely on the increase, and people are beginning to learn that such articles are not necessarily liable to break because they are cast. Time was when cast iron was unfit for any purpose where much strength was required, but the malleable castings of modern times are often better than the same articles made of wrought iron, and their cheapness is gradually extending the demand for them. We predict that the time will come when most small articles of iron will be cast, and forging will be the exception, instead of the rule as at present.

The amount of scientific research and experiment now being brought to bear on the real nature of iron and steel, and the improved methods of manufacturing these most important metals, can hardly fail to produce as great improvements before the close of the present century as have taken place already. It may even yet be found possible to cast edge tools of as good quality as those now forged from steel.

ONE-SIDED RECIPROCITY ABOUT PATENTS.

We have received through our correspondent at Montreal a copy of the proposed patent bill for the Canadian Dominion, introduced by Hon. Mr. Chapias. We have examined the bill with some care, and regret to state that it retains the only feature which has hitherto rendered the Canadian patent system odious; viz., excluding all non-resident alien inventors from the right to take patents. Canada is the only civilized country on the face of the earth that refuses to accord a spirit of reciprocity in respect to patents for new inventions. Omission to do this can only be explained by the fact that the Canadian people desire to prey upon the ingenuity of our own and other inventors. If Canada will abolish her patent system entirely, then we shall have no reason to complain; but the Government carefully enacts a patent system to grant patents to resident subjects, but as respects the rights of aliens they must reside in the country for one year next preceding the application, and make oath to the invention as original.

This system is a libel upon justice; and we sincerely hope that the Canadian Parliament will modify the bill before it finally becomes a law. We hope, also, that our Government will not enter into a new treaty of reciprocity with Canada without insisting upon a recognition of the right of American inventors to take out patents in the Dominion.

We call the attention of the Secretary of State to this matter. We insist that our men of ingenuity have long enough submitted to this injustice.

USEFUL MEN---PERSONAL SKETCHES.

If our country has any one need to supply, it is that of men who are willing to devote themselves to the propagation of truth and the diffusion of useful knowledge. It is therefore with much pleasure that we introduce to our readers an extract from a letter recently received at this office from Rev. J. M. Baker, of Fayettville, Texas. He says:

> I have been detained from superintending the construction of a new model of my "Universal Cultivator," by the protracted sickness of my wife. She died last week in the triumph of a Christian faith.
>
> I am extensively known in Mississippi, Louisiana, and Texas as an itinerant minister, and could act as an agent for any laudable invention, or newspaper, etc. My plan will be to travel in a two-horse rockaway, preach on the Sabbath, lecture during the week on Agriculture, and sell patents and act as an agent, should you or any of your friends want an agent in Texas, Louisiana, or Mississippi. For my standing and respectability I would refer you to "Bangs' History of Methodism," minutes of the Ohio conference, 1817. In the history, the "M," by oversight of my friends, was left out and my name appears as "Job Baker." For my present standing I refer you to Isaac G. Johns, Editor of the Galveston *Christian Advocate*, Texas.
>
> It has struck my mind that the "asbestos roofing" would suit in Western Texas. There is no pinery west of the Colorado river, in Texas. The whole western world is settling up. Shingles range from $6 to $8 per thousand.

It will be evident to all our readers that this correspondent, Mr. Baker, is one of those rare citizens, who is willing to make himself generally useful.

The letter of Mr. Baker, reminds us of a subscriber—another of that rare and useful class—who formerly resided in Iowa. In writing to us upon some business matters he stated that on week days he was "farmer, glazier, and homeopathic physician, and on Sundays a preacher of the blessed gospel."

Of the same class of useful citizens, though not a preacher is Mr. George Sibbald, of Preston, Md., who has made several inventions, but owing to misfortunes he has not been able to obtain means sufficient to perfect and patent them, and desires to obtain the assistance of a partner for that purpose.

Mr. Sibbald's narrative of the misfortunes which have overtaken his family are peculiarly touching. He says:

> I have only a few days ago executed powers of attorney with gentlemen of high standing to prosecute the recovery of our grandfather George's estate—three millions of acres of land. The original deeds are lost, but all the records show possession.
>
> I cannot even pay for an advertisement for a partner to bring out such an invention as my high-pressure air engine. Oh! if you could only even advertise for me, a few lines, on credit, how kindly I would take it. Other papers have often advertised for my father—many columns—about his claims, etc., on long credits, for hundreds of dollars. Our family is one of the most ancient and largest owners of real estate, and of ships and mills, in the country. We are descended from the ancient family of Sibbalds, of Scotland, and my brother-in-law's family, from the ancient Setons of Scottish history; his grandfather was Sir Andrew Seton; and my mother's house is related to the Lord Norths, of England; her great-grandmother was Lady North; and she is also connected with the Snowdens of Wales, England. We all have our family arms; that of the Sibbalds is a cross argent on an azure field; and the motto on the several branches is beautiful. The Seton arms are a sword and crescent and lilies. The sword was given by Robert Bruce for service in the "Holy Wars." My mother's arms are stars and shells, and a peacock crest. I seal this letter with my grandfather's silver seal, having his initials—a bequest to me—and for whom I am named.
>
> Sometimes thoughts pass through my mind that this government is a failure, and that the "Japanese Prince," who is reported to have "laughed himself to death" at the idea of a people attempting to govern themselves, was not so foolish after all. I have long thought that we shall, finally, have an Empire, and that the alleged prophecy of James Hoag, the Quaker, will yet be entirely fulfilled, as truly as the fore part has been. I have seen so much corruption and injustice among politicians, and have suffered so much, that excuse me gentlemen if I have given but a moment's place to such passing thoughts. I sometimes think that the rebellion of this country against "old England," was wrong, and that Providence has repaid us in the same manner, perhaps; and that perhaps the best thing might be to go back to old England, and unite again under the "cross flag" of the greatest of nations—to prevent more civil wars and ruin.

There is something anomalous in this case of Mr. Sibbald. Here is a gentleman of honorable lineage struggling with the direst misfortunes, when the records clearly show, as he asserts, that he is an heir to an estate of three millions of acres. No wonder, when such injustice is allowed, that the sufferer should turn his attention to the mother country where his ancestry runs almost upon royal lines. We should be glad if the publication of this brief story of the Sibbald family should result in bringing assistance to this ingenious descendant.

Spontaneous Ignition of Fireworks.

Mr. R. Trevor Clarke, in a communication to the *Times* on the frequency of fires in pyrotechnical manufactories—which he thinks may, in many cases, be attributed to the spontaneous combustion of that class of fireworks called colored fires—observes, "That these compositions, the active agent in which is chlorate of potash, occasionally 'go off of themselves,' has long been known, but, I believe, no definite information on a subject so important, has ever been laid before the public. Herewith I send you, what I know of my own knowledge in the matter: Firstly, mixtures of chlorate of potash, sulphur, and black oxide of copper are almost certain to ignite sooner or later, at uncertain periods, after mixing, and without premonitory phenomena. Secondly, mixtures of chlorate of potash, sulphur, and nitrate of strontia, in quantities larger than about an ounce, will frequently take fire within a few hours after they are made. When nitrate of baryta is substituted for strontia, the liability is nearly as great. When sulphuret of antimony or charcoal is added, the liability is greatly lessened, but probably not entirely done away with. Thirdly, when any of these compositions have become damp and ineffective from the deliquescent nature of the salts employed, and are submitted to too much heat for the purpose of drying them, they will suffer a peculiar and sudden decomposition followed by actual ignition. In the second case mentioned, decomposition is manifested by the evolution of an orange-colored gas, which hangs as a cloud or vapor over the compound. If the desiccation of the salts has been thoroughly effected prior to mixing, and the atmosphere be in a damp state from weather or any other cause, the mixture, unless at once secured from moisture, will often ignite in an hour from the making. In the third case, as soon as the temperature rises to a certain hight, the mass begins to hiss and bubble, suffering a kind of fusion, accompanied with the production of the gas or vapor before alluded to. Of the nature of this vapor, which smells both of chlorine and nitric oxide, I am ignorant. The action is probably catalytic, and induced by the energetic absorption of moisture from the air. Our chemists could do no better service to the community than by investigating this matter thoroughly."

How to Use Carbolic Acid.

A Canada paper states that Messrs. Salt of Birmingham, have constructed a very ingenious and well-designed apparatus for the vaporization of carbolic acid, by means of which that valuable disinfectant can be diffused through the rooms of a house without any of the disadvantages attending its use in its ordinary liquid state. The apparatus consists of a receptacle for the acid covered by a finely perforated lid. Beneath the receptacle is an air chamber, and beneath this chamber is a recess for a spirit-lamp. Two or three tablespoonfuls or more of carbolic acid, if in the liquid form, or a portion of the crystals having been placed in the upper receptacle, the lamp is lighted, and in a few moments the acid begins to evaporate and the vapor is diffused into the atmosphere of the apartment through the perforated plate. The apparatus will be found an excellent addition to the sick room, where it is found desirable to use carbolic acid as a disinfecting agent. Its great advantage is that it can be so manipulated as to keep the atmosphere charged with a distinct but not unpleasant odor of the acid, by increasing or diminishing the supply as may be required, and it will thus be found particularly handy and useful in private houses.

Electric Actions for Organs.

[illegible] has been attempted [illegible] electricity to actions for organs, on both sides of the Atlantic, and several devices of the kind have been patented in England, France, and America. These devices have demonstrated the feasibility of the plan. The object to be attained in the use of an electric action is to obviate the necessity of the complicated system of wooden trackers and its adjuncts, and to make a far lighter action, which will admit of the placing of the key board at any distance from, and in any position relatively to the organ itself.

Mr. H. L. Roosevelt, of New York, patented through the Scientific American Agency, April 13, 1869, a very pretty, and in several respects unique device, relating to an improvement in electric organ actions.

This device requires a separate battery for each octave of the organ. [illegible] power.

Another prominent feature [illegible] of that metal, as well as the oxidation of the point of the connecting wire. The ingenuity and efficiency of this feature of the invention will be at once obvious to those conversant with the difficulties which it is designed to obviate.

The pedal action and the manual are electrically united at the will of the performer by means of a sliding wedge or [illegible] electric machines. Without drawings and voluminous description it cannot be made very clear to those not posted in such details. The action works easily, and without the disagreeable rattling of the old tracker actions. An organ with this action attached is now on exhibition at the factory of Messrs. H[illegible] [illegible] to call and [illegible]

Editorial Summary.

ANOTHER SWINDLE.—Mr. [illegible] and Financial managers of the New York Jewelers' Co-operative [illegible] Mr. Black [illegible] that ticket No. 418 has drawn a gold watch valued at $200 and that [illegible] licited, and not wishing to be imposed upon he asks us to investigate the matter in his behalf. If Mr. Black cannot see *swindle* all over the face of the various papers sent to him, then we advise him to forward the $10, and learn just what [illegible]

THAT remarkable [illegible] known as [illegible] South Australia. It is found in Australia on the surface of the ground, where the soil is sandy [illegible] pear to have exuded from beneath. When burnt off occasionally by the bush fires, it is found again after the winter season, in considerable quantities and of various thicknesses. Analysis proves it to contain 6·2 per cent, or somewhat more, of a pure hydro-carboniferous oil. Its value for gas-manufacturing purposes would be great, and it is also believed to be applicable to the production of certain dyes.

THE London *Athenæum* reports the discovery in the Bodleian Library, Oxford, of a single copy of a work printed by William Caxton, the first English printer, who commenced the practice of his art about the year 1480. Very few of the issues of the pioneer publisher are in existence. The pamphlet just discovered [illegible] Latin. [illegible]

THE Macon and Brunswick Railroad is now wholly under contract and will be completed from Brunswick to station No. [illegible] Albany and Gulf Railroad [illegible] first of July and to Macon [illegible] November next, [illegible] for the cotton crop of 1869. [illegible] to the [illegible] and Charleston, S. C. [illegible]

[illegible]

DR. CARTER MOFFAT has succeeded [illegible] lowed to fall, drop by drop, on a surface of pure water, and which Professor Tomlinson, has shown to be characteristic of each oil. The method is very simple, and is, briefly, to obtain a pattern on water, note the time, lay on the paper, glazed sized downwards, for an instant, take out, draw through a plate of ink, remove, and wash with water. The process is capable of great extension, and will be valuable to paper stainers and others.

A [illegible] and dextrine with it. These substances have not hitherto been easy to discover when mixed with the glycerin; the following process is, however, said to answer perfectly. [illegible] 5 drops of the glycerin to be tested add 100 to 120 drops of water, [illegible] of pure nitric acid (25 per cent), and boil for about a minute and a half. If any sugar or dextrine is present, the mixture assumes a deep blue color.

ACCORDING to M. Millon, the disagreeable odor of bisulphide of carbon can be got rid of by distilling it with quick lime, the two having been in contact twenty-four hours. The distillate is received in a flask partially filled with clean copper turnings. The lime remaining in the retort is strongly colored. By means of the deodorized bisulphide, MM. Millon and Commaille have separated the perfume of milk to the extent of recognizing certain plants eaten by the cow—the *Smyrnium olusatrum* among others.

HERR PAALZOW has been making experiments from which he concludes that there is no relation between the conductibility for heat and that for electricity. He has experimented on the following substances, and has found that they have the following order in point of conductibility of heat and electricity:—Heat: Mercury, water, sulphate of copper, sulphuric acid, sulphate of zinc, solution of sea-salt. Electricity: Mercury, sulphuric acid, solution of sea-salt, sulphate of zinc, sulphate of copper, water.

PATENT OFFICE DECISION.—We hope none of our readers will omit to read the decision of Commissioner Fisher, published in another column. It is not only an interesting paper, but it sets forth in a strong light the views of the new Commissioner of Patents as to what constitutes a new and useful invention within the meaning of the law. There is a spirit of freshness and liberality about this decision which will commend it to the favor of inventors.

THE CASTOR BEAN is becoming an important article of culture in Texas. This year hundreds of acres are planted; the soil is prolific, and in some instances has yielded 60 bushels of castor beans to the acre. Very little machinery has as yet been introduced for getting out the oil. The ramie plant is also attracting attention. It is looked upon as of great value [illegible]

A PLUMBER of Davenport, Iowa, bought 35,000 pounds of [illegible] about seven cents a pound. [illegible] pound, and would have supplied an army of more than two hundred thousand men. They are to be melted down for the brass and solder.

IT has been suggested to us by a distinguished engineer [illegible] in our last issue might [illegible] up ordinary grindstones. [illegible] tool as well as actual experiment in its use for this purpose.

THE German astronomer, Maedler has measured the hight of 1,093 mountains in the moon. Twenty-two of these are higher than Mount Blanc, which is within a few feet of being three miles high; six are above 19,000 feet. The highest observed mountain in the moon is 24,844 feet high.

THE *Chicago Tribune* says that a business depression of more than ordinary weight is felt in that city. There is dullness in trade, [illegible]

VELOCITY OF THE WIND.—[illegible]

RUB some bichromate of potassa fine, pour over it about twice the bulk of sulphuric acid, and mix this with an equal quantity of water. The dirtiest brass is cleaned in a trice. Wash immediately in plenty of water, wipe it, rub perfectly dry and polish with powdered rotten stone.

A MACHINE has been invented and put in operation in California, which, it is said, has cut, thrashed cleaned and sacked the wheat from twenty acres in ten hours, with only three men to work it.

THE high price asked for pianofortes, it is stated, is due to the great strength required in the frame of the instrument to resist the tension of the strings, which, in some instances, amounts to sixteen tuns.

[illegible] stores have failed in St. Louis during [illegible]

[illegible]

HOW TO KEEP CANALS OPEN IN WINTER.—DECISION OF THE COMMISSIONER OF PATENTS.

In the matter of [illegible]

[illegible] a new and useful mode of prevent[illegible]

[illegible] which have been [illegible] where hot water has been [illegible]

[illegible] none of the means suggested will [illegible] scribed in the patent. At a later stage to this application [illegible]

[illegible] upon the first point, that the invention does [illegible] water may be prevented from freezing by [illegible] heat may be applied or steam [illegible]

[illegible] application for a new [illegible]

[illegible] upon the value of their inventions. It can only see that the purpose proposed, if accomplished, would be useful, or that the plan does not show the absence of some part obviously essential to any end whatever. Beyond this it can only oppose the opinion of man to man, an opinion by which if all your great inventions had been tried when first presented to the Office or the public, the great majority of them would have been strangled at [illegible]

[illegible] Board of Examiners-in-Chief is reversed, and a [illegible]

(Signed) S. S. FISHER, Commissioner.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

BESSEMER STEEL.—The *London Mining Journal* says that it is understood that Mr. Bessemer has signified his willingness to reduce his royalties from [illegible] per ton [illegible] ting the steel rails to be [illegible] that of iron. If the Heaton process should solve the question of converting cheap pig iron into steel, iron rails may, probably, be entirely displaced.

A NEW [illegible] CAVE.—A remarkable natural cave has just been discovered near [illegible] The opening [illegible] the loose rocks with which it was encumbered, a room twenty-five by forty feet was discovered, with passages leading from it to an indefinite distance, none of which has yet been explored. The walls are composed of lime [illegible] intermixed with spar and mineral-bearing quartz, which promises to [illegible] returns to the miners.

The 10,000 pound equestrian statue of Washington, destined for the Public Garden in Boston, is rapidly approaching completion at the Ames establishment in Chicopee. The most of the work now remaining to be done is the caparisoning of the charger astride which the colossal figure of the Father of his Country is to be placed.

English workingmen are said to have formed a joint stock association, shares one pound each, for the purpose of facilitating their emigration to this country. They have sent out a delegation to Nebraska to report on the desirableness of that country for a home.

The Colorado *Miner* says that the largest piece of silver bullion ever produced in the United States was recently taken off the cupel at the Brown Company's works. The weight was [illegible] pounds Troy; currency value $1[illegible],000. The amount of ore was between [illegible] and [illegible] tons.

[illegible] at the opening of the canal. The line of the excursion from that point lies through China and Japan, across the Pacific ocean to San Francisco, and via Pacific railroad to New York.

[illegible] of Australasian gold imported into Britain during the two [illegible] of this year was [illegible] as compared with [illegible]

[illegible] expenses incurred by the city of San Francisco by reason [illegible] and the prevalence of the small pox, during the past year [illegible]

[illegible]

The Missouri Pacific Railroad Company have ordered 10 new engines, [illegible] freight cars, and 1,800 tons of new rails, preparatory to the change to the narrow gage, which, it is contemplated, will be made in June.

The tariff on dispatches between this city and England, on and after the [illegible] will be $10 gold, for ten words or less, and $1 (gold) for each word in excess of the limit.

The people of St. Mary and New Iberia, La., have organized an immigrant Labor Association, in order to meet the increasing demand for laborers in that portion of the State.

The St. Louis and Illinois Bridge Company commenced operations on the Illinois side of the river on the 11th of May. The boring was begun and will be continued until the rock is reached on which to lay the foundation [illegible]

A Pittsburgh oil firm have obtained a verdict against the United States Telegraph Company, in the Court of Common Pleas, for damages amounting to $1[illegible] for not transmitting a business telegram.

Facts for the Ladies.

[illegible]

An Iron Constitution

Is an appropriate figure of speech, as applied [illegible] without a sufficiency of iron in the system, it can neith[illegible] during [illegible]. Bearing this fact in mind, let all who [illegible] or physical debility, whether general or local [illegible] Iron and Sulphur Powders. The combination is [illegible] ments which science declares that the weak and nervous need: iron, to augment the vital forces, and sulphur, to disinfect the blood and the secretions. For debility, in all its varieties, and whether at [illegible]

[illegible]

Mailed free. HALL & RUCKEL, 218 Greenwich st., New York.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

$10 to $25.—The Secret Letter Writer and Private Telegraphic Dispatch. No business man should do without it. Agents make $10 to [illegible] per day. Send 25c. for sample to Fowler & Co., No. 21 Park Row, New York.

Grindstones of any size or grit can be had by sending a half ounce sample of grit wanted by mail. J. E. Mitchell, 310 York ave., Phila.

The best gas mach ne invented.—Gas made by combining hydrogen and carbon gives a brighter light with less consumption, than coal gas. State rights for sale. Apply to C. F. Dunderdale, 90 Wall st.

Isometric drawing—Illustrated pamphlet, giving full instructions, free by mail for only 25c. C. C. Klein, 134 Hamilton st., Phila., Pa.

For Sale—A valuable patent right—Soper's Micrometer Calipers. Address S. Moore, 211 Park st., Detroit, Mich.

Green lumber dried in two days. Also, tobacco, meal, and every substance, cheaply. Circulars free. H. G. Bulkley, 135 Fulton st., New York.

Chemical Fire Engine—Lapham & Clark patent. State rights for sale. Address Geo. Clark, Jr., Boston, Mass.

Valuable Patent for sale—A patent apparatus for cooking with gas over any side burner. Address M. Hermann, New Bremen, Ohio.

Park Place.—Rockwood, 839 Broadway, can photograph your Machine if he can secure an exposure of thirty minutes.

Wanted—Address of manufacturers of Threshers from all parts of the United States. John A. Hafner, Commerce, Mo.

Stencil goods and dies. E. H. Payn, Payn's Block, Burlington, Vt.

Automatic Lathes, for spools, tassel molds, and druggists' boxes, made by H. H. Frary, Jonesville, Vt.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

A complete set of Blanchard Plow-handle Machinery, consisting of lathe, bender with 40 forms, and finishing machine. Has been used but a short time, and is in good order. Address S. N. Brown & Co., Dayton, O.

Builders, and all who contemplate making improvements in buildings, can save time and money by addressing A. J. Bicknell & Co., Publishers, Troy, N. Y., or Springfield, Ill.

Saw Mills can find a steady purchaser for "Cheap" oak, elm, etc., sawed into shape, by addressing Box 6,721, New York Postoffice.

Johnson's Adjustable Hangers for shafting. Diploma awarded by the American Institute. Shop rights twenty-five dollars. Pattern castings 6 cents per lb. Address Wm. Cowin, Lambertville, N. J.

The Tanite Emery Wheel—see advertisement on inside page.

An English machine-making firm is open to make arrangements to manufacture and introduce in England any good American invention. Satisfactory references given. Address Box 1286 Postoffice, N. Y.

Henry W. Bulkley, Mechanical Engineer, 70 Broadway, New York, intending soon to visit England, etc., will attend to professional business requiring an agent abroad.

Machine for bending fellies—Patent for sale—the whole, or State Rights. Address DeLyon & Werner, Canton, Miss.

Diamond carbon, formed into wedge or other shapes for pointing and edging tools or cutters for drilling and working stone, etc. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

The Tanite Emery Wheel.—For circulars of this superior wheel, address "Tanite Co.," Stroudsburgh, Pa.

The Magic Comb will color gray hair a permanent black or brown. Sent by mail for $1.25. Address Wm. Patton, Treasurer Magic Comb Co., Springfield, Mass.

W. J. T.—We think the patent asbestos roofing manufactured by H. W. Johns, of this city, is the best substitute for tin or slate. It is cheap and easily applied.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Machinists, boiler makers, tinners, and workers of sheet metals read advertisement of Parker's Power Presses.

Millstone dressing diamond machine, simple, effective, durable. Also, Glazier's diamonds. John Dickinson, 64 Nassau st., New York.

Water wheel Patents, Nos. 24,455 and 27,673 for sale. Price $1,000. The "first" that used an adjustable diaphragm in wheel and guide. H. Ross, Middlebury, Vt.

Mortising Machines—Two second-hand Lane & Bodley hub mortising machines, wood column. Will be sold cheap. Address S. N. Brown & Co., Dayton, Ohio.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent [illegible]

ATTACHMENT TO BORING BRACES.—John S. Fray, Bridgeport, Conn.—This invention relates to a new and useful attachment to braces for boring with [illegible]

WHEEL FOR VEHICLES.—[illegible] invention is to construct a light wh[illegible] and other vehicles, and which will combin[illegible] great lightness and simplicity of construction. It consists in the [illegible]tion of a corrugated tire, made of sheet or thin metal, which is so shaped that it is higher at or near the edges than in the middle, and which is at or

[illegible] by a de[illegible] he tends to strength[illegible]

[illegible]—E. L. Smith, Derby, Conn. [illegible] the height of [illegible] in case there is too little or too much water in the boiler. The invention consists in the use of a [illegible] by jointed or flexible pipes, connected with [illegible] when the same, and which, when it is filled, overcomes the power of a spring or weighted lever and [illegible] by that motion, either a valve to the pump, or whistle, [illegible] for throwing the pumping engine out of gear, while it will be raised [illegible] when too little water [illegible]

[illegible]—Gaetano Fortieta, New York city.—This invention re[illegible] of that class in which the seat is pivoted to a supporting frame, [illegible] held in front and rear by a spring or springs. The [illegible] falls on the back [illegible]

[illegible] PAPER.—Albert Rohrbeck, New York city. [illegible] machine for stamping [illegible] one [illegible] tree of sheets, it requiring [illegible] the whole cutting face of the [illegible]

[illegible] which is so arranged that the curtain can be ro[illegible] at any desired hight, or entirely wound up on, or unwound from the [illegible]

COMPOSITION FOR FLOORS.—Theodor Landmann, [illegible], Ohio. This invention rela[illegible] and floors of [illegible] oven, which can be [illegible]

[illegible] adapted for hunting, but which may also be [illegible]tary purposes. Its object is not so much to obtain rapidity for loading, but more particularly certainty of action, accuracy, and lightness. The invention consists in an entirely novel apparatus for holding [illegible]

WINDOW SHADE FIXTURES.—G. W. Neil, Philadelphia, Pa.—This invention relates to a new cord-tightener for window shade fixtures, and consists of a plate or holder, which is provided with a toothed inner face, and of a forked-shaped hook sliding thereon. This hook fits over the teeth of the holder, and is arrested by the same, in any desired [illegible] keep the cord stretched, the said cord being fitted over [illegible] a roller arranged thereon.

HORSE HAY RAKE.—E. Spear and W. H. Spear, Orland, Ind.—This in[illegible] to furnish an improved revolving horse hay rake [illegible] construction, easily operated, and effective in operation, doing its work quickly and thoroughly.

VENT FOR CANS, ETC.—Theodore W. Burger, New York city.—This invention has for [illegible] guide, which shall be simple [illegible] liable to become choked up.

MONEY DRAWER.—R. B. Zwahlen, New York city.—This invention relates to a new device for locking money drawers, and all other draw[illegible] by pressing the bolt down with the edge of a knife or other sharp instrument inserted between the top of the drawer and the top plate. The invention consists chiefly in setting the lock some distance below the top edge of the drawer, and in attaching a bar to the top plate of the counter, table, or bureau, into which bar the bolt is locked. This bar reaches behind the crevice formed above the front plate of the drawer, and prevents the application of any tool through said crevice.

[illegible]—This invention relates to a new machine for sawing the facings of moldings and of ornamental designs by means of circular or straight saws, so that, especially for ornamental pendants and projections, the machine can be advantageously employed. The invention consists more particularly in the application of a new saw blade, which has the cross section of the molding to be cut, and which is gradually tapered to a point, and toothed on its tapering edge, so that every portion of the cross section is thereby made [illegible]

TWINE WINDERS.—Marcus Brown Westhead, Manchester, and C. B. James, Redditch, England.—This invention relates to a new manner of preparing the ordinary flat twine winders to make them at once holders for thread, needles, pins, buttons, or other articles, and the invention consists in transforming the ordinary flat winders upon which sewing or embroidering thread is usually wound into cases, sheaths, or receptacles open at one or both ends to contain a packet or packets of needles, a few pins, or safety pins, or a strip or strips of buttons or hooks and eyes, or a combination of any or all of these articles with the sewing the material.

MACHINE FOR SEPARATING SLATE FROM COAL.—L. P. Garner, Ashland, Pa.—This invention consists in an arrangement of a circular grate upon a horizontal axis, the bars of which are of peculiar form, especially adapted to the purpose through which the coal is caused to pass, together with certain devices to prevent the same from clogging.

CURTAIN FIXTURES.—Benj. F. Cloud, Philadelphia, Pa.—This invention relates to improvements in curtain fixtures, designed to provide an improved arrangement of means for suspending the rollers of curtains, such as are arranged for winding on rollers at the top of the window, so that the roller may be lowered from the top of the windows when required, to allows full passage thereat for air or for other purposes.

GATE ATTACHMENT.—John W. Everham, Pittsgrove, N. J.—This invention has for its object to furnish an improved gate attachm[illegible] which shall be so constructed and arranged as to serve either as a hinge or latch as occasion may require.

EVAPORATOR.—Henry Stoller, Watertown, Ohio.—This invention has for its object to furnish an improved evaporator, designed especially for evaporating sorghum juice, but equally applicable for evaporating other saccharine juices, which shall be so constructed and arranged that the sirup may be "finished" by the heat of the evaporating juice in such a way that it may be impossible for the said sirup to be scorched or burnt during the operation.

[illegible]—Daniel Fasig, Rowsburgh, Ohio.—This in[illegible] employed in seizing any partic[illegible] signed more particularly for seizing hogs, where any one, of a number, are selected and are to be separated from the main body for slaughter or sale.

PREPARING ZINC FOR ORGAN [illegible] New York city.—This invention has for its object to furnish a method for preparing zinc for organ pipes and various other purposes, in such a way that the zinc will not oxidize and so that the amount of its expansion and contraction from changes of temperature will be very greatly diminished, [illegible] the same time its softness and firmness will be greatly increased.

MEMORANDUM BOOK.—J. H. Guest and E. Fawcett, New Albany, Ind.—This invention relates to a new and useful improvement in books for keep[illegible] and for other purposes, and consists in attaching the [illegible] by means of a hinge of leather, cloth, metal, or other [illegible] material.

LOCKING DEVICE FOR STOP COCKS.—Valentine T. Hall, Brooklyn, N. Y.—This invention relates to a new and improved method of securing stop cocks of gas, water, and steam pipes, and stop cocks used for all similar pur

[illegible] being opened, [illegible] proper [illegible]

[illegible] J. Marit Jones, [illegible] Ky.—This in[illegible] improvement in locks for dwellings [illegible]

[illegible]—Thomas W. [illegible], Philadelphia, Pa.—This invention [illegible] new and useful improve[illegible] in tables or boards for ironing [illegible]

[illegible] improvements in operating drop drills in the process [illegible] rock, earth, or other material, in artesian well or other [illegible]

[illegible]

[illegible] improvements in [illegible] are pivoted [illegible] which may be more permanently [illegible]

[illegible]—Mrs. A. H. Swartz, Carlisle, Pa.—This invention consists in the provision of adjustable bottoms for the cribs, whereby the beds may be adjusted nearer to or farther from the top of the railing, according to the activity of the [illegible] falling out.

[illegible], Tenn.—This in[illegible] improvements in distilling apparatus designed to provide an attachment for the boilers or stills, as commonly arranged, whereby the [illegible] be filtered through charcoal, instead of exposing the whole body of the liquors to the charcoal, as is commonly practiced; also an arrangement to facilitate the charging of the apparatus with coal and discharging [illegible]

[illegible].—This invention relates to improvements in machinery for operating drills for drilling [illegible] wells, designed to provide an improved arrangement of driving [illegible] to lessen the unequal strains upon the engine and other parts arising [illegible] and easy working device; also, to provide a convenient and simple device for throwing the [illegible] mechanism in or out of gear with the driving cam, or [illegible] the effect of the same upon the drill, and also certain improvement in guide apparatus for the drill rope.

[illegible] made in two parts, capable of employment, [illegible] as an ordinary presser, the parts being separated longitudinally through the center, and one so arranged with an independent shank working vertically in brackets upon the other, that when required it may be raised up out of contact with the [illegible] and turned back in the direction opposite to that of the working position. The attachment of the presser support is [illegible] that the presser may be adjusted laterally.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING MAY 11, 1869.

Reported Officially for the Scientific American.

SCHEDULE OF PATENT OFFICE FEES:

[illegible]

90,810.—[illegible]
90,811.—BEEHIVE.—Thos. Atkinson, Memphis, Tenn.
90,812.—TUCK CREASER FOR SEWING MACHINES.—L. W. Bar[illegible]
90,813.—[illegible] Ohio.
90,814.—COTTON BALE TIE.—G. N. Beard, St. Louis, Mo.
90,815.—CAP FOR PRESERVE JARS.—Louis R. Boyd, New [illegible]
90,816.—[illegible]
90,817.—COMPOSITION METAL FOR EYELETS.—G. B. Brayton, [illegible] or to "The Novelty Eyelet Company," Boston, Mass.
90,8[illegible].—SPARK-CONVEYING DEVICE.—J. G. Bredin, [illegible]

[illegible]

90,8[illegible].—WATER CLOSET.—H. H. Craigie, New York city.
90,8[illegible].—[illegible]—H. H. Craigie, New York city.
90,830.—WATER CLOSET.—H. H. Craigie, New York city.
90,8[illegible].—[illegible] Cleveland, Ohio.
[illegible]
90,8[illegible].—[illegible] SCALE.—J. G. Dyer, Chicago, Ill.
90,833.—STOVE GRATE.—Wm. Hailes, Albany, N. Y.
90,834.—MACHINE FOR CLEANING HAIR FROM HIDES.—Alfred [illegible]

[illegible]

89,876.—Manufacture of Steel-faced Iron Plates.—Hugh McDonald, Pittsburgh, Pa.

89,877.—Shoe-knife and Gage.—Robert R. McDonald, Syracuse, N. Y.

89,878.—Tile Machine.—J. C. Mckensie, Adrian, Mich.

89,879.—Veil-holder.—S. M. Meyenberg, New York city.

89,880.—Revolving Grate in Heating Stoves.—Glendy Moody, Falmouth, Me.

89,881.—Sheet Metal from Lead and Zinc.—Curtis C. Cady, Morgan, Auburn, N. Y., assignor to himself, Curtis C. Cady, and Elmore P. Ross.

89,882.—Seed Drill.—W. H. Nauman, Dayton, Ohio. Antedated April 13, 1869.

89,883.—Curtain Fixture.—G. W. Nell, Philadelphia, Pa.

89,884.—Hardening and Washing "Ransome Concrete Stone."—Richard Norris, Jr., Baltimore, Md.

89,885.—Pump.—D. C. Owen, Adams county, Ill.

89,886.—Key.—Emery Parker, New Britain, Conn.

89,887.—Printing Telegraph.—George M. Phelps, Brooklyn, N. Y.

89,888.—Grate Bar for Furnaces and Heaters.—Jesse Reynolds, Philadelphia, Pa.

89,889.—Breech-loading Fire-arm.—Westley Richards, Birmingham, England.

89,890.—Cotton Gin.—C. G. Sargent, Westford, Mass.

89,891.—Cotton Gin.—C. G. Sargent, Westford, and A. B. Ely, Newton, Mass.

89,892.—Pump.—John Seeberger and Joseph Seeberger, West Troy, N. Y.

89,893.—Gate Fastener.—Henry S. Shisler, Manheim Township, Pa.

89,894.—Parlor Game.—A. W. Smith, Birmingham, Pa.

89,895.—Revolving Bin.—E. J. Smith, Chicago, Ill.

89,896.—Beehive.—C. E. Spaulding, Theresa, N. Y. Antedated April 8, 1869.

89,897.—Rocking Chair and Rotary Fan.—Martin Stiefenhofer, City Island, N. Y.

89,898.—Paper Fastener.—J. F. Tapley (assignor to himself, Samuel Bowles, B. F. Bowles, and Clark W. Bryan), Springfield, Mass.

89,899.—Hay Spreader.—J. F. Thomas, Ilion, N. Y.

89,900.—Milk Cooler.—Asaph Thompson, Hudson, Ohio.

89,901.—Milk Cooler.—Asaph Thompson, Hudson, and Jas. Darling, Northfield Township, Ohio.

89,902.—Breech-loading Fire-arm.—S. F. Van Choate, Boston, Mass.

89,903.—Cooking Stove.—T. B. Walker, Wakefield, Mass.

29,904.—Feed-Regulator for Mills.—Martin Weaver (assignor to to himself and Philip Foreman), East Earl Township, Pa.

89,905.—Ventilator and Refrigerator.—Wm. Wellington, Rockford, Ill.

89,906.—Wood-Splitting Machine.—Wm. L. Williams, New York city.

89,907.—Flour Bolt.—W. H. Allen, and Wm. Stoddard, Winona, Minn.

89,908.—Car Wheel.—R. N. Allen and L. W. Kimball, Pittsford, Vt., assignors to themselves, W. H. Mallory, and E. L. Butterfield, New York city.

89,909.—Pneumatic Pump.—J. A. Bailey, Detroit, Mich.

89,910.—Explosive Compound.—Otto H. Bandisch, Berlin, Prussia, assignor to Fred. Volckmann, Hoboken, N. J.

89,911.—Machine for Carving.—Virgil W. Blanchard, Bridport, Vt.

89,912.—Bed Bottom.—A. T. Boon and J. H. Bell, Galesburg, Ill.

89,913.—Car Coupling.—A. Branshaw, Fond du Lac, Wis.

89,914.—Vent for Cans.—T. W. Burger, New York city.

89,915.—Braiding Foot for Sewing Machines.—Dan'l C. Chester, Ogdensburg, N. Y.

89,916.—Steam Generator.—J. M. Clark, New York city.

89,917.—Curtain Fixture.—B. F. Cloud, Philadelphia, Pa.

89,918.—Pump.—J. W. Cole, Mount Pleasant, Iowa.

89,919.—Foot Measure for Shoemakers.—Charles Cross, Louisville, Ky.

89,920.—Horse Hay-Fork.—Fred. Ebert, Saxonburg, Pa.

89,921.—Needle Wrapper.—Geo. Ewart, New York city.

89,922.—Device for Seizing Animals.—Daniel Fasig, Rowsburg, Ohio.

89,923.—Banjo.—John Field, New York city.

89,924.—Rocking Chair.—Gaetano Formica, New York city.

89,925.—Attachment to Boring Brace.—J. S. Fray (assignor to himself and Horace Pigg), Bridgeport, Conn.

89,926.—Curtain Fixture.—C. E. Fritts, Oneonta, N.Y.

89,927.—Coal Screen.—L. P. Garner, Ashland, Pa.

89,928.—Memorandum Book.—Jas. H. Guest and Elwood Fawcett, New Albany, Ind.

89,929.—Locking Device for Stop Cocks.—V. T. Hall, Brooklyn, N. Y.

89,930.—Locking Case for Stop Cocks.—V. T. Hall, Brooklyn, N. Y.

89,931.—Door Lock.—J. Waytt Jones, Paducah, Ky.

89,932.—Operating Drill.—T. D. Keith (assignor to himself and E. J. Dahm), Maryville, Wis.

89,933.—Composition for Floors, Sidewalks, etc.—Theo. Landmann, Cincinnati, Ohio.

89,934.—Coffee Roaster.—Israel Long, Terre Haute, Ind.

89,935.—Warp-Beam for Loom for Weaving Skirts.—F. X. Loughery, Kelleysville, Pa.

89,936.—Electric Alarm.—C. T. Mason, Sumter, S. C.

89,937.—Machine for Cutting Moldings in Wood.—W. A. McDonald, Morrisania, N. Y.

89,938.—Horse Hay-Fork.—D. B. Neal (assignor to himself W. W. McClenaskey, and E. C. Chase), Mount Gilead, Ohio.

89,939.—Extension End Board for Wagons.—Stewart Neff and Allen Pick, Chillicothe, Ill.

89,940.—Pen.—H. L. Pratt, Beverly, Mass., administrator of the estate of E. L. Pratt, deceased.

89,941.—Boiler Scraper.—H. L. Pratt, Beverly, Mass., administrator of the estate of E. L. Pratt, deceased.

89,942.—Door Fastener.—Wm. Quayle, Warsaw, Ill.

89,943.—Ironing Table.—T. M. Richards, Philadelphia, Pa., assignor to J. H. Eaton, Burlington, N. J.

89,944.—Rock Drilling Machine.—J. H. Roberts, Nashville, Tenn.

89,945.—Apparatus for Stamping Lace Paper.—Albert Holzbeck, New York city.

89,946.—Draining Apparatus.—John Roy, New Orleans, La.

89,947.—Breech-Loading Firearm.—Gustav Schulz, Fort Madison, Iowa.

89,948.—Bridge.—Fred. H. Smith, Baltimore, Md.

89,949.—Alarm Feed-Water Regulator for Boilers.—N. L. Smith, Derby, Conn.

89,950.—Horse Rake.—E. R. Spear and W. R. Spear, Orland, Ind.

89,951.—Evaporator.—Henry Stoller, Watertown, Ohio.

89,952.—Apparatus for Supplying Air to Hydrocarbon Burners.—Jas. Stratton (assignor to W. W. Illsworth), Phil'a., Pa.

89,953.—Child's Crib.—A. R. Swartz, Carlisle, Pa.

89,954.—Sash Holder.—J. H. Teahl and J. C. Zimmerman, Eberly's Mills, Pa.

89,955.—Breech-Loading Arm.—L. B. Tiebel (assignor to himself and Charles Mattern), Hudson City, N. J.

89,956.—Horse Rake.—Albert Tschop and Jacob Hartman, East Berlin, Pa.

89,957.—Presser Foot for Sewing Machines.—Sara Tutton, Tunkhannock, Pa.

89,958.—Cotton Planter.—A. R. Wiggs, Iuka, Miss.

89,959.—Pipe Cutter.—A. G. Wilder, Cohoes, N. Y.

89,960.—Velocipede.—B. F. Wilson, Geddes, N. Y.

89,961.—Apparatus for Distilling and Purifying Spirits.—Dan. Woodard, Springfield, Tenn.

89,962.—Till Check.—R. B. Zwahlen, New York city.

89,963.—Bolting Reel.—J. T. Agnor, Lexington, Va.

89,964.—Velocipede.—John Allgaier, Philadelphia, Pa.

89,965.—Breech-loading Ordnance.—Wm. Bacon, Monticello, Kansas.

89,966.—Sample Holder.—G. L. Bailey, Portland, Me.

89,967.—Fastening for Collars.—M. B. Battey, Washington, D. C.

89,968.—Corn Harvester.—J. C. Beam, Woodside, Ill.

89,969.—Head-Block for Saw Mills.—A. M. Beard, Hillsborough, N. H.

89,970.—Picture Nail.—J. W. Bishop, New Haven, Conn.

89,971.—Apple Parer and Slicer.—G. W. Brokaw, Lodi, N. Y.

89,972.—Horse Rake.—Irvine Carman, Sandwich, Ill.

89,973.—Harvester.—G. T. Coolman and Chas. M. Young, Corry, Pa.

89,974.—Railroad Car Ventilator.—William G. Creamer, Brooklyn, N. Y.

89,975.—Sash Fastener.—J. L. Devol, Parkersburg, W. Va.

89,976.—Car Seat.—J. S. Diack, Aurora, Ill.

89,977.—Velocipede.—C. J. Doty and A. S. Dickinson, Washington, D. C.

89,978.—Gate Hinge.—J. W. Evrham, Pittsgrove, N. J.

89,979.—Corn Harvester.—J. H. Fisher and Chas. Holcomb, Mendota, Ill.

89,980.—Process of Preparing Zinc for Organ Pipes and for Other Purposes.—Carl Fogelberg, New York city.

89,981.—Lawn Mower.—Thomas Garrick, Providence, R. I.

89,982.—Wooden Burial Case.—Joseph Gawler, Washington, D. C.

89,983.—Grass Renovator.—James Gould, Lexington, Mass.

89,984.—Hand-Spinning Machine.—Belville A. Grant, Lockport, Ill.

89,985.—Cracker Machine.—Gordon Y. Gray, Niles, Mich.

89,986.—Furnace for Steam and Other Engineery.—C. B. Gregory, Beverly, N. J.

89,987.—Sewing Machine.—Lev. Griswold, Brooklyn, N. Y.

89,988.—Distillation of Hydrocarbon Oils.—Henry Grogan and George Y. Lape, New York city.

89,989.—Combination Lock.—Henry Grosse, Tiffin, Ohio.

89,990.—Planing Machine.—E. P. Halsted, Worcester, Mass., assignor to H. Ball & Company.

89,991.—Supplemental Horseshoe.—Thomas P. Handy and Christian H. Kleibacker, Baltimore, Md.

89,992.—Pressure Gage for Hydrostatic Presses.—Thos. Harbottle, Brooklyn, N. Y.

89,993.—Folding Bedstead.—Thos. B. Harkins, Bristol, Pa.

89,994.—Washing Machine.—Robert Hermance, Schuylerville, N. Y.

89,995.—Underpinning for Buildings.—Increase S. Hill, Boston, and Andrew Burnham, North Chelsea, Mass.

89,996.—Pitcher.—J. H. Hobbs, Wheeling, W. Va.

89,997.—Lithographic Press.—August Hoen, Baltimore, Md.

89,998.—Apparatus for Freeing Petroleum and Other Liquids from Gas.—Albert H. Hook, New York city, assignor to Smith Gardner.

89,999.—Car Spring.—E. J. Horner, Wilmington, Del.

90,000.—Turbine Water Wheel.—Abijah Hubbell, Salisbury, Conn, assignor to himself, George V. Capron, and E. P. H. Capron.

90,001.—Washing Machine.—Abel L. Hurtt, Monticello, Ind.

90,002.—Churn.—H. E. James, West Alexandria, Pa.

90,003.—Machine for Making Cut Nails.—S. K. Jones and George H. Snow, New Haven, Conn., assignors to S. K. Jones, A. A. Wilcox, Lysander Flagg, and Jesse Cadworth, Jr.

90,004.—Graining Apparatus.—Wm. H. Kay, Lemont, Ill.

90,005.—Feed Device for Saw Mill.—John E. Keyt, Louisville, Ky.

90,006.—Method of Preparing and Embossing Wood.—William Kopp, Louisville, Ky.

90,007.—Pocket Lantern.—Charles Mackh, Elgin, Ill.

90,008.—Corn Planter.—Napoleon Maisonneuve, Kankakee, Ill.

90,009.—Automatic Fan.—John Maltry, Morrisania, N. Y.

90,010.—Saw-sharpening Device.—Thomas Markland, Jr., Philadelphia, Pa.

90,011.—Flour Bolt.—Rufus S. Mitchel and George Z. Kessinger, Elizabeth, Ind.

90,012.—Carbureter.—Edmon L. Mix, Rochester, N. Y.

90,013.—Bag Tie.—George Murray, Waterloo, N. Y.

90,014.—Compound for Hardening Cast Iron.—Byron W. Nichols (assignor to himself, Cornelius Aultman, George H. Buckins, Perry S. Sowers, and A. Clark Younts) Canton, Ohio.

90,015.—Water Cock.—Henry S. North and Thomas Thompson, Middletown, Conn., assignors to themselves and Daniel R. Beeham.

90,016.—Boot Crimp.—Abraham Overholt, Gardenville, Pa.

90,017.—Advertising Calendar.—John D. Parsons, Albany, N. Y.

90,018.—Combined Carrier and Dresser for Tobacco.—Fredrich August Panck, St. Mary's, Ohio.

90,019.—Steam Pipe for Reversing Steam Engines.—Joseph B. Pedrick (assignor to himself and Joseph F. Gould), Columbus, Ind.

90,020.—Harvester.—John G. Perry, Kingston, R. I.

90,021.—Lamp Shade Holder.—Joseph T. Pope, New York city.

90,022.—Method of Sheathing Vessels, etc.—Dan Read, Hudson City, N. J.

90,023.—Railway Rail.—Samuel J. Reeves, Philadelphia, Pa.

90,024.—Breech-loading Firearm.—Benjamin S. Roberts, United States Army.

90,025.—Leveling Staff.—William H. Robinson, Vermont, Ill.

90,026.—Buckle.—George W. Roland, Salem, Oregon.

90,027.—Lumber Dryer.—W. C. Scott, Richmond, Ind.

90,028.—Hog Ring.—W. S. Shoemaker, Towsontown, Md., and E. H. Shoemaker, Lancaster, Ohio.

90,029.—Counting Register.—Gerard Sickels, Boston, Mass.

90,030.—Coffee and Teapot.—Michael Simons, Middletown, Conn.

90,031.—Hose.—George C. Smith, Matteawan, N. Y.

90,032.—Velocipede.—Hugh Smith, Newark, N. J.

90,033.—Steam Generator.—Thomas S. Speakman, Camden, N. J.

90,034.—Velocipede.—Charles Spring, Hyde Park, and Andrew Spring, Weston, Mass.

90,035.—Washing and Fulling Machine.—James Taylor, Philadelphia, Pa., assignor to himself, Benjamin Schofield, and Thomas Branson.

90,036.—Child's Table Tray.—Alexander Turner, Newark, N. J.

90,037.—Cork Fastener.—E. D. Wetherbee, Worcester, Mass.

90,038.—Stump Extractor.—Bela W. Weaver, Transitville, Ind.

90,039.—Power Press for Hay, etc.—Jacob H. Wittmer, (assignor to himself and William Sipler), Manor, Pa.

90,040.—Glassware Mold.—Alonzo E. Young, Dorchester, Mass., assignor to Boston Silver-glass Company.

90,041.—Machine for Forming Oval Tenons.—C. W. Cotton, Portsmouth, Ohio.

90,042.—Washing Machine.—Thomas H. De Motte, Woodford county, Ill.

90,043.—Sawing Machine.—William Gardiner, Stoneborough, Pa.

90,044.—Measuring Can for Liquids.—Joseph S. Gold, Springfield, Ill.

90,045.—Machine-made Stitch.—Alexander Harroun, Jr., Onondaga county, N. Y.

90,046.—Center Board.—Beverly Kennon, New Orleans, La.

90,047.—Automatic Boiler Feeder.—Paul Narcisse Joseph Masselon, Paris, France.

90,048.—Tonic Bitters.—J. H. McCartney, Dansville, N. Y.

90,049.—Method of Attaching to the Soles of Boots and Shoes Heels made of Vulcanized Wood.—F. Henry Morgan, Beverly, Mass.

90,050.—Mosquito and Fly Net.—A. M. Rogers, Brooklyn, N. Y.

90,051.—Air Inhaler.—Z. Rogers, Chicago, Ill.

90,052.—Book Curb.—Mary A. H. Saurman, Philadelphia, Pa.

90,053.—Wine and Cider Press.—Jacob Scholer, Burlington, Iowa.

90,054.—Mosquito-Bar Frame.—Henry Searle, Washington, D. C.

90,055.—Clothes-Line Clamp.—W. S. Shoemaker, Towsontown, Md., and E. H. Shoemaker, Lancaster, Ohio.

90,056.—Graining Machine.—W. H. Smith, New York city.

90,057.—Phosphate Fertilizing Compound.—David Stewart, Port Penn, Del.

90,058.—Dermatic Medicator.—I. R. Welsiger, Danville, Ky.

90,059.—Sewing Package.—Marcus Brown Westhead, Manchester, and Charles Bartlett James, Redditch, England, assignors to Marcus Brown Westhead.

90,060.—Railway Car.—Daniel Fitzgerald, New York city.

90,061.—Washing Machine.—H. H. Waters, Atlanta, Ga.

REISSUES.

66,957.—Base-Burning Stove.—Dated July 23, 1867; reissue 3,426.—W. C. Durand, West Troy, N. Y.

86,948.—Apparatus and Process for Evaporating Liquids.—Dated February 16, 1869; reissue 3,427.—Division A.—J. J. Sherman, Albany, N. Y.

86,948.—Apparatus and Process for Evaporating Liquids.—Dated February 16, 1869; reissue 3,428.—Division B.—J. J. Sherman, Albany, N. Y.

73,666.—Knob Latch.—Dated January 21, 1868; reissue 3,429.—H. C. Storrs, New York city.

9,041.—Sewing Machine.—Dated June 15, 1852; extended seven years; reissue 3,430.—Wheeler & Wilson Manufacturing Company Bridgeport, Conn., assignees, by mesne assignments, of A. B. Wilson.

83,131.—Saw Frame.—Dated October 20, 1868; reissue 3,431.—Beauman Butler, St. Johnsbury Center, Vt., for himself, and B. M. Tillotson, Manchester, N. H., assignee of C. F. Ramsay.

38,519.—Table Tray or Waiter.—Dated May 12, 1863; reissue 3,432.—P. A. Doherty, Boston, Mass., assignee of Jane O. Waterman (widow) and J. D. Martin, administrator of the estate of Nathaniel Waterman, deceased.

56,042.—Bridge.—Dated July 3, 1866; reissue 2,586, dated April 30, 1867; reissue 3,433.—David Hammond, Canton, Ohio.

38,694.—Hydrant.—Dated May 26, 1863; reissue 3,434.—J. G. Murdock, Cincinnati, Ohio.

79,421.—Boat.—Dated June 30, 1868; reissue 3,435.—Elisha Waters and G. A. Waters, Troy, N. Y.

84,626.—Heating Stove.—Dated December 1, 1868; reissue 3,436.—W. E. Marston, Troy, N. Y., assignee of Elizabeth Hawks.

DESIGNS.

3,478.—Frame for a Sewing Machine.—W. B. Bartram, Danbury, Conn.

3,479.—Floor Oil Cloth, etc.—Hugh Christie, Morrisania, assignor to Deborah Powers, A. E. Powers, and N. B. Powers, Lansingburgh, N. Y.

3,480.—Floor Oil Cloth.—Hugh Christie, Morrisania, (assignor to Deborah Powers, A. E. Powers, and N. B. Powers), Lansingburgh, N. Y.

3,481.—Ice Pitcher.—Nathan Lawrence, Taunton, Mass.

3,482.—Cook's Range.—John Martino, Jacob Beesley, and John Currie (assignors to Henry McClenaghan), Philadelphia, Pa.

3,483.—Cook's Stove.—John Martino, Jacob Beesley, and John Currie, Philadelphia, Pa., assignors to Charles Sharpe, and E. L. Thomson.

3,484 and 3,485.—Carpet.—C. T. Meyer, Bergen, N. J. assignor to E. C. Sampson, New York city. Two Patents.

3,486.—Sewing Machine Frame.—L. Porter, Rochester, N. Y.

3,487.—Stove.—Garrettson Smith and Henry Brown, Philadelphia, assignors to E. S. Shantz and Joseph Johnson, Royer's Ford, Pa.

3,488.—Lamp Pedestal.—Stephen Spoor, Phelps, N. Y.

3,489.—Fireman's Badge.—J. L. D. Sullivan, Somerville, Mass.

3,490.—Music Rack.—Chas. Zeuner, Cincinnati, Ohio.

3,491.—Fur Set Box.—Jason Crane, Bloomfield, N. J.

3,492.—Set of Blocks for an Alphabet Puzzle.—Henry Johnson, Wauregan, Conn.

3,493.—Plates of a Stove.—Rodman Backus, Albany, N. Y.

3,494.—Glass Ware.—W. O. Davis, Portland, Me.

3,495.—Ornamenting the Edges of Paper Collars.—Franklin Field (assignor to himself and Charles E. and Charles A. Brown), Troy, N. Y.

EXTENSIONS.

Steam Generator.—Finley Latta, of Cincinnati, Ohio, administrator of A. B. Latta, deceased.—Letters Patent No. 12,662, dated April 10, 1855.

Plate Holders for Cameras.—A. S. Southworth, of Boston, Mass.—Letters Patent No. 12,700, dated April 10, 1855; reissue No. 1,059, dated September 25, 1860.

Furnace for Burning Wet Fuel.—Aaron Woodman, New York city, administrator of Moses Thompson, deceased.—Letters Patent No. 12,678, dated April 10, 1855; reissue No. 388, dated October 7, 1856; reissue No. 446, dated March 31, 1857.

Slide Rest for Lathes.—Chester Van Horn, Springfield, Mass.—Letters Patent No. 12,742, dated April 17, 1855.

Dredging Machine.—Chas. H. Fondé, Mobile, Ala.—Letters Patent No. 12,730, dated April 17, 1855.

Ships' Windlass.—James Emerson, of Lowell, Mass.—Letters Patent No. 12,718, dated April 17, 1855; reissue No. 1,030, dated July 31, 1860.

Manufacture of Slate Pencils.—N. C. Harris, of Poultney, Vt.—Letters Patent No. 12,739, dated April 24, 1855.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

[illegible].—Heating by Steam for Manufacturing and other Purposes.—[illegible], New York city. April 2, 1869.

[illegible].—Looms for Weaving.—J. W. Drummond, Schenectady, N. Y. April 6, 1869.

[illegible].—Manufacture of Paper.—E. C. Warren, Brooklyn, N. Y. April 6, 1869.

[illegible].—Baking Oven.—Joseph Yale, Beloit, Wis. April 6, 1869.

[illegible].—Permanent Way of Railways.—D. B. Pratt, Worcester, Mass. April 7, 1869.

1,080.—Steam Generator.—J. B. Root, New York city. April 8, 1869.

1,090.—Waterproofing Process.—Charles Toppan, Wakefield, Mass. April 9, 1869.

[illegible].—Firearm.—S. F. Van Choate, Boston, Mass. April 15, 1869.

[illegible].—Rotary Engines, Pumps, and Meters.—J. F. Denavarro, New York city. April 9, 1869.

[illegible].—Sewing Machine.—Albin Warth, Stapleton, N. Y. April 10, 1869.

[illegible].—Stitch for Sewing together Straw, Braid, etc., and Machinery for Making the same.—N. A. Baldwin, Milford, Conn. April 12, 1869.

1,134.—Joints for Railroad Rails.—Joseph Adams, Fair Haven, Vt. April 13, 1869.

1,136.—Apparatus for Making Compound Telegraph Wire or Conductors.—Alanson Cary, New York city, M. G. Farmer, G. F. Milliken, and J. M. Batchelder, Boston, Mass. April 13, 1869.

[illegible].—Apparatus for Burning Liquid Hydrocarbons.—Robert Taylor, Montreal, Canada. April 14, 1869.

[illegible].—Valves and Valve Gear for Steam Engines.—A. K. Rider, New York city. April 15, 1869.

[illegible].—Manufacture of Heavy Hydro-Carbon Oils.—J. Merril, Boston Mass. April 16, 1869.

1,079.—Steam Boilers, etc.—J. A. Miller, New York city. April 9, 1869.

[illegible].—Presses for Compressing Cotton, etc.—Messrs. J. H. Adams & [illegible], New York city. April 9, 1869.

[illegible].—Motive Power.—W. F. Goodwin, New York city. [illegible]

[illegible].—Manufacture of Boots and Shoes.—E. F. Richardson, Lawrence, Mass. April 14, 1869.

[illegible].—Fan Blower.—Patrick Clark and J. H. Shotwell, Rahway, N. J. April 15, 1869.

[illegible].—Safety Attachment to Burners.—J. S. Lipps, Brooklyn, N. Y. April 16, 1869.

[illegible].—Repeating Firearms and Ordnance, and in Ammunition for the same.—O. F. Winchester, New Haven, Conn. April 17, 1869.

[illegible].—Friction Matches and Match Boxes.—W. H. Hughes, New York city. April 15, 1869.

[illegible].—Feed Water Apparatus.—Philander Shaw, Boston, Mass. April 19, 1869.

[illegible].—Producing Fine Iron Direct from Crude Iron Ore.—Edward Brady, Philadelphia, Pa. April 20, 1869.

[illegible].—Lamps.—J. M. Perkins and [illegible], Cleveland, Ohio. April 20, 1869.

[illegible].—Locks.—Nicholas Fries, New York city. April 22, 1869.

[illegible].—Smelting and other Furnaces.—Samuel [illegible], Boston, Mass. April 22, 1869.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

G. C. K., of Ky.—We are informed that marble that is yellow from age, or covered with green fungoid patches, may be rendered white by first washing it with a solution of permanganate of potash, of moderate strength, and while yet moist with this solution, rubbing with a cloth saturated with oxalic acid. As soon as the portion of the stone operated upon becomes white, it should be thoroughly washed with pure water to remove all trace of the acid. Care is necessary in using the acid as it is violently poisonous when taken into the stomach, and has frequently been the cause of death by being mistaken for Epsom salts.

T. W. B., of Ky.—You may transfer an exact image of a brass die impression, taken in ink upon the surface of steel, by previously coating the steel with white wax dissolved by the aid of spirits of turpentine. The evaporation of the turpentine will leave an even thin layer of wax upon the steel. Or you can take a tracing of the brass die with ordinary tracing paper and a lead pencil, and laying the tracing on the steel previously coated, can transfer it by gently rubbing on the back of the paper. The second query you make is not clear. The glass used by watchmakers and jewelers is powerful enough for use in ordinary engraving.

W. A. B., of Geo.—We shall be glad to receive from you, or any other of our numerous correspondents items respecting the development of industrial interests in the country.

S. B., of N. Y.—We have no personal knowledge of the magic diamond. We cannot of course keep the run of the character of all the articles advertised in our columns.

E. G. B., of D. C.—Raw hide dissolves completely in water heated under pressure. Thus dissolved it has all the properties of crude glue, in fact it is a crude glue, and will adhere to any surface to which ordinary glue will adhere.

M. J., of Ky.—The best wheel for gumming saws is a vulcanized rubber and emery wheel. You can not advantageously use a wet stone for this purpose.

W. H. E., of Del.—A ball projected on an inclined surface in the direction of the descent will traverse a greater distance than it would on a level surface.

C. W. G., of Pa.—The nearer to the stand pipe the discharge of water takes place, the greater will be the throw from the butt of a hose, on account of reduced friction, all other things being equal.

J. H., of Pa.—Your suggestion about an inventor's assistant agency, appears well upon paper, and similar schemes have been attempted, but without success. We cannot give it our approval as a practical plan of operating new improvements.

PATENT OFFICES,
American and European,
OF
MUNN & CO.,
No. 37 Park Row, New York.

For a period of nearly twenty-five years MUNN & Co. have occupied the position of leading solicitors of American and European Patents, and during this extended experience of nearly a quarter of a century, they have examined not less than fifty thousand alleged new inventions, and have prosecuted upwards of thirty thousand applications for patents, and, in addition to this, they have made at the Patent Office over twenty thousand Preliminary Examinations into the novelty of inventions, with a careful report on the same.

This wide experience has not been confined to any single class of inventions but has embraced the whole range of classification, such as Steam and Air Engines, Sewing Machines, Looms and Spinning Machinery, Textile Manufactures, Agriculture and Agricultural Implements, Builders' Hardware, Calorifics, Carriages, Chemical Processes, Civil Engineering, Brick making, Compositions, Felting and Hat Making, Fine Arts, Fire-arms, Glass Manufacture, Grinding Mills, Harvesters, Household Furniture, Hydraulics and Pneumatics, Illumination, Leather Manufactures, Mechanical Engineering, Metallurgy, Metal Working, Navigation, Paper Making, Philosophical Instruments, Presses, Printing and Stationery, Railroads and Cars, Sports, Games, and Toys, Stone Working, Surgical Apparatus, Wearing Apparel, Wood Working.

MUNN & Co. deem it safe to say that nearly one-third of the whole number of applications made for patents during the past fifteen years has passed through their Agency.

CONSULTATIONS AND OPINIONS FREE.

Those who have made inventions and desire to consult with us are cordially invited to do so. We shall be happy to see them in person, at our office, or to advise them by letter. In all cases they may expect from us *an honest opinion*. For such consultation, opinion, and advice, *we make no charge*. A pen-and-ink sketch and a description of the invention should be sent. Write plainly, do not use pencil or pale ink.

If a SPECIAL SEARCH at the Patent Office is required, which embraces a personal examination of all patented inventions and a report in writing, a fee of $5 is charged. This examination is only advised in doubtful cases.

To Apply for a Patent, a model must be furnished, not over a foot in any dimension. Send model to Munn & Co., 37 Park Row, New York, by express, charges paid, also a description of the improvement, and remit $16 to cover first Government fee, revenue and postage stamps.

The model should be neatly made of any suitable materials, strongly fastened, without glue, and neatly painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show with clearness, the nature and operation of the improvement.

THE GREAT ADVANTAGES

OF MUNN & CO.'S AGENCY are that their practice has been ten-fold greater than any other Agency in existence, with the additional advantage of having the assistance of the best professional skill in every department, and a Branch Office at Washington, which watches and supervises all their cases as they pass through official examination. If a case is rejected for any cause, or objections made to a claim, the reasons are inquired into and communicated to the applicant, with sketches and explanations of the references; and should it appear that the reasons given are insufficient, the claims are prosecuted immediately and the rejection set aside and usually

WITHOUT EXTRA CHARGE.

MUNN & Co. are determined to place within the reach of those who confide to them their business the highest professional skill and experience.

Caveats are desirable if an inventor is not fully prepared to apply for a Patent. A Caveat affords protection for one year against the issue of a patent to another for the same invention. Caveat papers should be carefully prepared.

Reissues.—A patent, when discovered to be defective, may be reissued, by the surrender of the original patent and the filing of amended papers. This proceeding should be taken with great care.

Patents can be Extended.—All patents issued prior to 1851, and now in force, may be extended for a period of seven years upon the presentation of proper testimony. The extended term of a patent is frequently of much greater value than the first term, but an application for an extension, to be successful, must be carefully prepared. MUNN & Co. have had a large experience in obtaining extensions, and are prepared to give reliable advice.

Interferences between pending applications before the Commissioners are managed and testimony taken; also Assignments, Agreements and Licenses prepared. In fact there is no branch of the Patent Business which MUNN & Co. are not fully prepared to undertake and manage with fidelity and dispatch.

Designs, Trade Marks, and Compositions can be patented for a term of years; also new medicines or medical compounds, and useful mixtures of all kinds.

When the invention consists of a medicine or compound, or a new article of manufacture, or a new composition, samples of the article must be furnished, neatly put up. Also, send us a full statement of the ingredients, proportions, mode of preparation, uses, and merits.

EUROPEAN PATENTS.

American inventors should bear in mind that, as a general rule, any invention that is valuable to the patentee in this country is worth equally as much in England and some other foreign countries. Five Patents—American, English, French, Belgian and Prussian—will secure an inventor exclusive monopoly to his discovery among ONE HUNDRED AND THIRTY MILLIONS of the most intelligent people in the world. The facilities of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. MUNN & Co. have prepared and taken a larger number of European patents than any other American Agency. They have Agents of great experience in London, Paris, Berlin, and other cities.

For instructions concerning Foreign Patents, Reissues, Interferences, Hints on Selling Patents, Rules and Proceedings at the Patent Office, the Patent Laws, etc., see our Instruction Book. Sent free by mail on application. Those who receive more than one copy thereof will oblige by presenting it to their friends.

Address all communications to

MUNN & CO.,
No. 37 Park Row, New York City.
Office in Washington, corner of F and 7th streets.

Schedule of Patent Office Fees:

On each Caveat	$10
On filing each application for a Patent, (seventeen years)	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the extension	$50
On filing a Disclaimer	$10
On an application for Design (three and a half years)	$10
On an application for Design (seven years)	$15
On an application for Design (fourteen years)	$30

In addition to which there are some small revenue stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgment of their funds.

CITY SUBSCRIBERS.—The SCIENTIFIC AMERICAN will be delivered in every part of the city at $3·50 a year. Single copies for sale at all the News Stands in this city, Brooklyn, Jersey City, and Williamsburg, and by most of the News Dealers in the United States.

Advertisements.

The value of the SCIENTIFIC AMERICAN *as an advertising medium cannot be over estimated. Its circulation is ten times greater than that of any similar journal now published. It goes into all the States and Territories, and is read in all the principal libraries and reading-rooms of the world. We invite the attention of those who wish to make their business known to the annexed rates. A business man wants something more than to see his advertisement in a printed newspaper. He wants circulation. If it is worth 25 cents per line to advertise in a paper of three thousand circulation, it is worth $2·50 per line to advertise in one of thirty thousand.*

RATES OF ADVERTISING.

Back Page	$1·00 *a line.*
Inside Page	75 *cents a line.*

Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.

LOANS made on Life Policies and all 1st-class Securities. JOHN B. MURRAY, 17 Nassau st., N.Y. 22 2*

A YOUNG FRENCH-GERMAN CIVIL Engineer desires an appointment. Salary no object. Apply to A. K., room 45, No. 176 Bleecker st. 1*

A Mechanical Draftsman, of 8 years' experience, wants a situation. Address M. D., Postoffice, Providence, R. I.

DERBY COUPLINGS for Wagon Shafts & Poles.—5000 Wanted Immediately. Parties having the necessary facilities for their manufacture will please apply to DAN'L W. TALCOTT 123 Pearl st., or box 520, P.O.

TO Match Manufacturers.—Prof. H. Dussauce, Chemist, is ready to furnish the most recent processes to manufacture every kind of matches and chemicals employed in the fabrication. Address
Prof. H. DUSSAUCE, New Lebanon, N. Y.

PRACTICAL, Substantial, Durable, Cheap. Warranted as represented. Hand Slitting Saw Machine, self-feeding. Thousands in use; one man with ease rip board 3 in. thick, 18 ft. long, [illegible] 1 minute. Wm. H. Hoag, Man'f'r, 214 Pearl st., N.Y. P.O. Box 4245. Ag'ts wanted. 22 10

MECHANICAL DRAFTSMAN WANTED. One familiar with drawings for fine and ornamental castings and small machinery. Apply by letter, stating salary required and qualifications.
WM. G. CREAMER & SON, 10 Platt st., New York.

A PERSON OF 15 YEARS' EXPERIENCE as Foreman and Superintendent of an extensive Machine Shop in Conn., is at liberty, and ready for a new engagement in a similar capacity. No objection to going West. Parties requiring the services of such a man will please address, G. F. SNOW, West Meriden, Conn.

PATENT SAW MACHINES Manufactured. Also, Hand-Saw Blades imported in large quantities kept constantly on hand and sold at the cheapest prices by FIRST & PRYIBIL, 175 & 177 Hester st., N. Y. Send for Circular and Price List. 22 26

150-HORSE POWER BOILERS AND ENGINE for sale cheap. For particulars and descriptive circular, address
KELLY, HOWELL & LUDWIG,
22 2 525 Minor st., Philadelphia, Pa.

PATENT RIGHTS SOLD ON COMMISSION, and Valuable Inventions introduced by the most experienced Patent Salesmen in the Union. Can refer to over one hundred inventors for whom we have sold. E. E. ROBERTS & CO.,
Consulting Engineers, 15 Wall st., New York.

SOLUBLE GLASS SILICATE OF SODA, AND POTASH—Fire, Water, and Mildew-Proof, for Making Artificial Stone and Fabrics for Cementing, Plastering, and Painting on all surfaces. Sold in Barrels of 40 gals. Also, Kegs of 5, 10, or 20 gals., by the Manufacturers, L. & J. W. FEUCHTWANGER,
Chemists and Importers, 55 Cedar st., New York.
22 4

BURGH'S PRACTICAL RULES FOR THE proportions of
MODERN ENGINES AND BOILERS,
For Land and Marine Purposes. Pocketbook form, roan gilt........$1 75.
For sale by
D. VAN NOSTRAND,
23 Murray st., and 27 Warren st., (up stairs.)

WATER POWER.—For Sale Cheap, only 6½ miles from the city of Toronto, Canada West, a Saw Mill with first rate water power, and 15 acres of good land, a portion of it one of the best aspects in the Dominion for Grapes. The proprietor can suggest several paying manufactures to which the mill may be adapted. There are 200 acres of good land, well timbered, within a short distance of the mill, which may be had by any one desirous of of entering into lumbering operations. Address MILL OWNER, Box 342, Postoffice, Toronto. 22 2

THE SOLE AGENTS IN THE UNITED States and Territories for the MOST ECONOMICAL CONVENIENT, and USEFUL Invention of the age, the Endless Match lately commended by us, are Messrs. J. H. TENNENT & CO., 201 Pearl st., New York, who are also Sole Packers of TENNENT'S superior brands of Illuminating oil, and standard White Petroleum, to whom all orders and communications must be addressed.

J. P. GROSVENOR,
OF LOWELL, MASS.,
Patentee of the Older, and also, of the more Recent Improvements in Variety Molding Machines, consisting of the Variety Elliptical, Universal and Double Serpentine Molding and Planing Machines, and my Adjustable Circular Saw Benches. I am prepared to furnish these machines, to be used in any and all parts of the United States, (and the Right to Use goes with them,) at my list prices. Also, the various kinds of Wood-working Machinery. Address, for information and Machines,
J. P. GROSVENOR,
91 Liberty st., New York city, or at Lowell, Mass.
☞ Send for Descriptive Circular.

NOTICE.

THE Cooper Fire-arms Manufacturing Co., will offer at Public Sale, at their Works, Frankford, Philadelphia, on Friday, the 21st day of May, at 10 o'clock, A.M., the balance of their Machinery and Tools, consisting of Lathes, Drill Presses, Index Machines, Blacksmith's Tools, Trip Hammer, Cone Machines, Drops, Planers, Large Rifling Machine, and a lot of Special Machines and Tools used in the manufacture of Fire-arms. Also, a large lot of Shafting, Hangers and Pulleys.
The sale is positive, with the view of Closing up the affairs of the Company.
J. MASLIN COOPER,
For the Trustees.

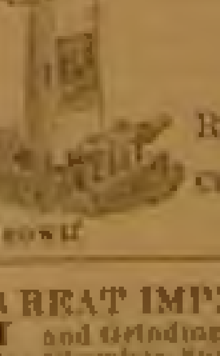
Turbine Water Wheels.

H. VAN DE WATER, Sir:—Your last improved Turbine Water Wheel, which we purchased and have run beside an overshot wheel under 16½ ft. head, long enough to give it a fair trial, has proved entirely satisfactory. We find that we can do more work, with water either high or low, with your wheel, than we can with the other. Yours uses less water and runs much more smoothly. From personal examination, also, of other first class Turbines, we can advise those in search of the BEST Turbine, and who wish to economize water, to use H. VAN DE WATER'S last IMPROVED TURBINE WATER WHEEL. The wheel we have is only 36 in. diameter, uses only 126 in. under 16½ ft. head, and drives two pair of 4½ ft. burrs to their full capacity. We wish you the greatest success. Respectfully yours,
T. S. GODDARD & CO., Lima, N. Y.
☞ H. VAN DE WATER'S address is Attica, N. Y.

E. M. MAYO'S
IMPROVED BOLT CUTTERS,
PATENTED NOV. 26, 1867.

WILL cut any size Bolt from one eighth of an inch to three inches in diameter, cutting any length screw required. The dies revolve, and will cut the thread one half inch to any length you wish. There is no stoppage in the machine in changing the bolts. When the thread is cut on the bolt the length you wish it, the dies open of themselves, and on withdrawing the bolt, the dies will close, and are ready for another bolt. The capacity of the machine has cut one hundred half-inch bolts, one inch thread, in twenty minutes; and one hundred and twenty three-quarter inch bolts, two-inch thread, in one hour. The dies are very simple, can be easily repaired when dull, and new ones can be fitted in with but little trouble, being only a straight piece of steel. The dies can be changed from one size bolt to another in two minutes. They can also be adjusted by a set screw so as to cut the bolts large or small.
1* E. M. MAYO, Cincinnati, Ohio.

J. A. FAY & CO.,
Cincinnati, Ohio, Manufacturers of
Patent Wood-Working Machinery,
VIZ:
Sash and Molding, Tenoning, Power Mortising, Scroll and Band Sawing Machines,
WOODWORTH PLANERS & MATCHERS,
ETC., ETC., ETC. ALSO,
Shafting & Pulleys, with Patent Cone Couplings & Patent Adjustable Hangers.
☞ Warranted Superior to any in use.
Send for circular.



Independent Steam
BOILER SUPPLY,
OR
Feed Pump.
RELIABLE FOR HOT OR COLD WATER.
Circulars sent free. COPE & CO.,
No. 118 East 2d st., Cincinnati, Ohio
18 eow tf

GREAT IMPROVEMENT IN CRUSHING and Grinding. To Miners, Ironmasters, Manufacturing Chemists, Superphosphate Makers, Bone Grinders, Dyewood Workers, etc., etc.—E. P. BAUGH'S Patent Sectional Crushing and Grinding Mills, for reducing to powder rocks, ores, slag, bones, logwoods, all kinds of mineral guano, and other tough and hard substances. For illustrated circular address BAUGH & SONS, 20 S. Delaware ave., Philadelphia. 21 4

WANTED — SECOND-HAND BOILER Punch and Rolls. Must take four or six feet. Address M. J. MARION, Titusville, Pa. 22 2*

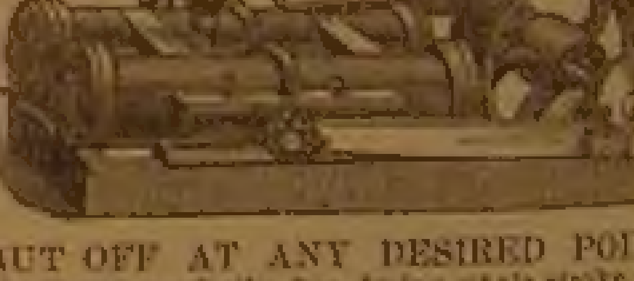
H. BOARDMAN, Lancaster, Pa.—Superior Patent Cork-cutting Machinery, Hard-laid Twine, Cord, and Rope Machinery, with Pat. Stop & Condenser. 15 9* tf

IRON STEAMERS, HULLS, & LIGHTERS. Estimates & Specifications furnished on application. HENRY J. DAVISON, 77 Liberty st., New York, Agent for Pusey, Jones & Co. 21 tf

FOR SALE—EVERY DESCRIPTION OF Machinery for Mining and Manufacturing purposes. Estimates furnished on application. HENRY J. DAVISON, Civil, Mining, and Mechanical Engineer, 77 Liberty st., New York. 21 tf

NEW ORLEANS FAIR REPORT:—"Greatest Attraction in Machine Hall—the Hand Saw Mill from manufactory of Wm. H. Hoag. Saves labor of four men." Self-feeding. Operated by one man. Many Thousands in use. Agents Wanted. For circulars WM. H. HOAG, 214 Pearl st., N. Y. Postoffice Box 4245. 20 2

HICKS' DUPLEX CUT-OFF ENGINES.



CUT OFF AT ANY DESIRED POINT; exhaust perfectly free during whole stroke. Unequaled for correctness of principles, economy in operation, and perfection of Workmanship. 25-Horse Power $750. THE HICKS MANUFACTURING CO.,
21 tf 85 Liberty st., New York.

☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟ ☟

TO THE WORKING CLASS:—I am now prepared to furnish all classes with constant employment at their homes, the whole of the time, or for the spare moments. Business new, light, and profitable. Fifty cents to $5 per evening, is easily earned by persons of either sex, and the boys and girls earn nearly as much as men. Great inducements are offered those who will devote their whole time to the business; and, that every person who sees this notice may send me their address and test the business for themselves, I make the following unparalleled offer: To all who are not well satisfied with the business, I will send $1 to pay for the trouble of writing me. Full particulars, directions, etc., sent free. Sample sent by mail for 10c. Address E. C. ALLEN, Augusta, Me.
19 8

THE
Tanite Emery Wheel.

THIS WHEEL CUTS FAST AND DOES not glaze, gum, heat or smell. For circulars address
THE TANITE CO.,
Stroudsburg, Monroe Co., Pa.

GENERAL AGENTS—Hart Manufacturing Co., 245 Pearl st., New York. Post & Goddard, 117 Liberty st., New York. Bloomfield, Myers & Co., 11 Dey st., New York. Charles M. Gheisley, 300 Commerce st., Philadelphia. American Twist Drill Co., Woonsocket, R. I. Thomas Flint & CO., 29 Federal st., Boston.

SPECIAL NOTICE.—EVERY Tanite Emery Wheel is carefully tested, before being sent from the factory, at a speed about DOUBLE that at which it is guaranteed to run. Customers can rely, with confidence, on the SAFETY as well as upon the cutting properties of these wheels.
21 tf

TO INVENTORS of articles in the Hardware line and in metals generally—all such manufactured by JOS. BALDWIN & CO., 201 Market st., Newark, N.J. 16 13*

STOCKS, DIES, AND SCREW PLATES, Horton's and other Chucks. JOHN ASHCROFT, 50 John st., New York. 23 tf

AMERICAN TURBINE WATER WHEEL. Stout, Mills & Temple's Patents. This celebrated iron-cased wheel is MORE DURABLE AND ECONOMICAL than any other, and is WARRANTED to give satisfaction in every case, OR MONEY REFUNDED. For illustrated circular address

FULTON MANUFACTURING CO., Fulton, N. Y. 13 26

BOILER FELTING SAVES TWENTY-five per cent of Fuel. JOHN ASHCROFT, 50 John st., New York. 16 tf

POWER LOOMS. Improved Drop Box, Spooling, Winding, Beaming, Dyeing, and Sizing Machines, Self-Acting, Wool-Scouring Machines, Hydra Extractors. Also, shafting, Pulleys, and Self-Oiling Adjustable Hangers, manuf'd by THOS. WOOD, 2106 Wood st., Philad'a, Pa. 13 13* tf

WOODBURY'S PATENT

Planing and Matching and Molding Machines, Gray & Wood's Planers, Self-oiling Saw Arbors, and other wood working machinery.

S. A. WOODS, 86 Liberty street, N. Y.;
Send for Circulars. 67 Sudbury street, Boston.
13 9* 1&2

ASHCROFT'S LOW-WATER DETECTOR will insure your Boiler against explosion. JOHN ASHCROFT, 50 John st., New York. 16 tf

LATHE CHUCKS of all kinds, with new improvements. A. F. CUSHMAN, Hartford, Conn. 17 6*

EMERY Harvester Sharpeners and Scythe Rifles made by S. L. Bushnell, Poughkeepsie, N.Y. Send for circular. 16 10*

STEAM AND WATER GAGES, STEAM Whistles, Gage Cocks, and Engineers' Supplies. 16 tf JOHN ASHCROFT, 50 John St., New York.

WOODWORTH PLANERS a SPECIALTY —From new patterns of the most approved style and workmanship. Wood-working Machinery generally. Nos. 24 and 26 Central, corner Union street, Worcester, Mass. Warerooms, 42 Cortlandt street, New York. 16 tf WITHERBY, RUGG & RICHARDSON.

BRONZE WORK.

HAVING FITTED UP OUR FOUNDERY with special reference to the above class of Work, we are now prepared to fill with promptness all orders for Bronze Castings of every description. ROBERT WOOD & CO., 1136 Ridge Avenue, Philadelphia. 10 13*

Excelsior Lubricator.

PATENTED AUG. 25th, 1868.—For Cylinders of Engines. A very Superior and Durable article manufactured by H. K. LEHMAN, Lehigh Valley Brass Works, Bethlehem, Pa. Descriptive circular and price list sent on application. 13 tf

HAIR AND WOOL FELT for sale by the square foot, or boilers covered by contract. HENRY J. DAVISON, 77 Liberty st., New York. 18 tf

McNab & Harlin,

MANUFACTURERS OF BRASS COCKS, Wrought Iron Pipe and Fittings for Steam, Water and Gas.

GETTY'S PATENT PROVING PUMP AND GAGE.
GETTY'S PATENT PIPE CUTTER.

Send for Illustrated Catalogue or price list. 15 13 86 John st., New York.

Artisans and Builder's

ORNAMENTAL IRON AND BRONZE WORKS.—Cast and Wrought-Iron Railing, Iron Stairs, Window Guards, Garden and Cemetery Adornments of every description, New and Improved Stable Furniture, etc., etc.

SPARKS, STILLMAN, DOWDELL & CO., Foundery 2028 N. Tenth st. Wareroom 807 Chestnut st Philadelphia. 18 13

For Machinists' Tools,

OF SUPERIOR QUALITY, WITH ALL Modern Improvements. Also, Improved Nut and Bolt Machinery. Address R. A. BELDEN & CO., New Haven, Conn. 18 tf

A BOOK THAT EVERYBODY SHOULD HAVE.

WELLS' EVERY MAN HIS OWN LAWYER, AND BUSINESS FORM BOOK,

Is a complete and reliable guide in all matters of law and business transactions for EVERY STATE IN THE UNION.

THE ENTIRE LEADING PRESS OF THE COUNTRY unqualifiedly indorse the work. We make a few short extracts from the press:

"As a legal adviser, always at hand to instruct the reader how to proceed in suits and business transactions of every and all kinds; as a form book to enable the least learned to draw up deeds, mortgages, agreements, leases, orders, wills, etc.; as a guide with regard to the laws of the various States concerning exemptions, liens, limitation of actions, collection of debts, usury, and so on, this volume is certainly invaluable to men of business, and it is not surprising that a hundred thousand copies have so soon found their way into the homes and country houses of the multitude. In addition, the work contains a full digest of the action of the Government relative to reconstruction and the freedmen, the General Bankrupt Law, the Patent Laws, Pension Laws, the Homestead Laws, the Internal Revenue Laws, etc. The publisher has determined to make this work complete, and [illegible] he has succeeded. No business man or woman can with safety be without it."—New York Times.

"This work is one of the most valuable issues of the press of this country. It contains so much that every man in business should know, but which none have the time to acquire from voluminous works, that it is truly indispensable."—New York Dispatch.

"Such a useful book cannot be too highly recommended. A more comprehensive digest could not be desired."—New York Weekly Tribune.

"There should be a copy of it in every family."—New York Weekly.

"The most implicit confidence can be placed upon the work as authority on all the subjects of which it treats."—Philadelphia Age.

"You can purchase in this book what may be worth hundreds of dollars to you."—St. Louis Dispatch.

"It contains just the kind of information every business man stands most in need of."—Sunday Mercury.

"Every man, no matter what his business may be, should have a copy."—Pittsburgh Dispatch.

"There is no better book of reference."—Phrenological Journal.

"The book is prepared to meet all the ordinary contingencies of business life, and it meets them clearly, distinctly, and well."—Round Table.

"It contains a vast amount of just such matter as every one ought to be acquainted with in the prosecution of all ordinary business."—N. Y. Christian Advocate.

"It is the best business guide ever published."—De Bow's Journal, St. Louis.

"Every one should have a copy."—N. Y. Eve. Post.

"It is invaluable."—Cincinnati Enquirer.

"Indispensable in every household."—Cincinnati Commercial.

"This work is worthy of the popularity it has acquired as a convenient and reliable manual."—N. Y. Herald.

The work is published (one size, 650 pages. Price in full leather binding $2.50; in half Morocco, $3. Sent post paid on receipt of price.

Good reliable agents wanted everywhere. They will find this the best selling book published. Liberal inducements given. Address

JOHN G. WELLS, Publisher,
432 Broome street, New York

PORTABLE STEAM ENGINES, COMBINing the maximum of efficiency, durability and economy, with the minimum of weight and price. They are widely and favorably known, more than 600 being in use. All warranted satisfactory or no sale. Descriptive circulars sent on application. Address 1 tf J. C. HOADLEY & CO. Lawrence, Mass.

Sault's Patent

FRICTIONLESS LOCOMOTIVE VALVES, easily applied; require no changes. 1* tf M. & T. SAULT COMPANY, New Haven, Conn.

BENT, GOODNOW & CO., Boston, Mass., Agents for the sale of Patents. FOR SALE—A variety of very valuable "Rights." Send stamp for THE PATENT STAR, Containing descriptions of each. 22 22

WROUGHT IRON

Beams and Girders.

THE Union Iron Mills, Pittsburgh, Pa. The attention of Engineers and Architects is called to our improved Wrought-iron Beams and Girders (patented), in which the compound welds between the stem and flanges, which have proved so objectionable in the old mode of manufacturing, are entirely avoided, we are prepared to furnish all sizes at terms as favorable as can be obtained elsewhere. For descriptive lithograph address the Union Iron Mills, Pittsburgh, Pa. 9 tf

RICHARDSON, MERIAM & CO., Manufacturers of the latest improved Patent Daniels' and Woodworth Planing Machines, Matching, Sash and molding, Tenoning, Mortising, Boring, Shaping, Vertical and Circular Resawing Machines, Saw Mills, Saw Arbors, Scroll Saws, Railway, Cut-off, and Rip-saw Machines, Spoke and Wood Turning Lathes, and various other kinds of Wood-working Machinery. Catalogues and price lists sent on application. Manufactory, Worcester, Mass. Warehouse, 107 Liberty st., New York. 17 tf

ROBERT McCALVEY, Manufacturer of HOISTING MACHINES AND DUMB WAITERS. 20 tf 602 Cherry st., Philadelphia, Pa.

BUERK'S WATCHMAN'S TIME DETECTOR.—Important for all large Corporations and Manufacturing concerns—capable of controlling with the utmost accuracy the motion of a watchman or patrolman, as the same reaches different stations of his beat. Send for a Circular. J. E. BUERK, P. O. Box 1,057, Boston, Mass.

N. B.—This detector is covered by two U. S. patents. Parties using or selling these instruments without authority from me will be dealt with according to law. 14 13* tf

Leather Belting.

Card Clothing, & Hose Factory. J. H. Haskell, Baltimore. 1 22*

THE NOVELTY IRON WORKS—Ft. E. 12th st., and 77 and 83 Liberty st., New York, Manufacture the most approved Turbine Wheel and Water Meter now made. 7 tf

WOOD WORKING MACHINES.

Smith's Improved Woodworth Planer & Matcher, Sash and Door, Molding, Mortising, and Tenoning Machines, Scroll Saws, Saw Mills, etc., at reduced prices. Address CHARLES H. SMITH, 135 North 3d st., Philadelphia, Pa. 11 13

PARKER'S POWER PRESSES.

THESE PRESSES are what are universally known as the "Fowler Press," improved, and are without a rival as regards strength and durability, combined with delicacy of adjustment of the Punch. We have just received

A GOLD MEDAL

From the New Hampshire Art and Mechanics' Association, it being the FIRST PREMIUM awarded on Presses, and was given us over

STILES' POWER PRESS.

☞ Notice is hereby given that ALL Presses having an Eccentric Disk on the Crank Shaft, are direct infringements of our Patent, April 13, 1858, reissued Feb. 9th, 1869, and all parties are hereby cautioned against buying or using said Presses without our permission.

PARKER BROTHERS,
West Meriden, Conn. 11 26*

NOTICE IS HEREBY GIVEN, that all persons purchasing our Presses will be protected against all suits that may be brought by PARKER BROS. under the patent of John A. Bailey, for rolling taper blanks; said patent having been bought up and reissued since we commenced suit against them, in the vain hope of defeating our rights. Trial will be had in April, when, our Counsel assures us, our patent will be triumphantly sustained. Meantime all parties are hereby cautioned against purchasing or using the Parker Press having an eccentric disk on the crank shaft for the purpose of adjusting the punch. Our Presses have been exhibited at, and received the highest Prizes from, all the FIRST-CLASS FAIRS in the country during the last five years.

Middletown, Conn. N. C. STILES.
15 tf

Heater & FILTER.

REMOVES LIME, SAND, AND MUD.

Best in use. All in want of a Water Purifier send for circular.

ARMSTRONG & WELSH,
Manufacturers, Bucyrus, Ohio.
19 4

STEAM HAMMERS, TURN-TABLES, and Foundery Cranes. Address 1 13 GREENLEAF & CO., Indianapolis, Ind.

MODELS, PATTERNS, EXPERIMENTAL, and other machinery, Models for the Patent Office, built to order by HOLSKE MACHINE CO., Nos. 528, 530, and 532 Water st., near Jefferson. Refer to SCIENTIFIC AMERICAN office. 1 tf

SHINGLE AND HEADING MACHINE—Law's Patent. The simplest and best in use. Shingle Heading and Stave Jointers, Stave Cutters, Equalizers Heading Turners, Planers, etc. Address 16 tf TREVOR & CO., Lockport, N. Y.

Sheet and Roll Brass,

BRASS AND COPPER WIRE.

German Silver, etc.,

Manufactured by the

THOMAS MANUFACTURING CO.,

Thomaston, Conn.

☞ Special attention to particular sizes and widths for Type Founders, Machinists, etc. 1 26*

LATHE CHUCKS—HORTON'S PATENT —from 4 to 36 inches. Also for car wheels. Address E. HORTON & SON, Windsor Locks, Conn. 17 tf

WROUGHT-Iron Pipe for Steam, Gas, and Water; Brass Globe Valves and Stop Cocks, Iron Fittings, etc. JOHN ASHCROFT, 50 John st., N. Y. 26 tf

Ornamen'l Iron Works.

CAST, WROUGHT IRON, AND WIRE RAILINGS,

Fountains, Vases, Verandas, Settees,

Chairs, Iron Stairs, Spiral and Straight WIRE WORK.

New and Improved Styles of STABLE FIXTURES.

ROBERT WOOD & CO.,
10 13* 1136 Ridge Avenue, Philadelphia.

$3000 SALARY. Address U. S. Piano Co N. Y 10 52

13 13

CAMDEN

Tool and Tube Works.

Camden, N. J. Manufacturers of Wrought Iron Tube, Brass Work and Fittings, and all the most improved TOOLS for Screwing, Cutting, and Fitting Pipe. Screwing Machines for Pipe, of five different sizes. Pipe Tongs, Common and Adjustable; Pipe Cutters, Pipe Vises, Taps, Reamers, Drills, Screwing Stocks, and Solid Dies. Peace's Patent Screwing Stocks, with dies. No. 1 Screws ¼, ⅜, ½, ¾ Pipe. Price complete, $10. No. 2 Screws, 1, 1¼, 1½, 2 Pipe, $20. No. 3 both screws and cuts off, 2½, 3, 3½, 4, $65. 11 13*

FOR STEAM ENGINES, BOILERS, SAW Mills, Cotton Gins, address the ALBERTSON AND DOUGLASS MACHINE CO., New London, Conn. 14 tf

PAPER BAG Machines For Sale. Address 4 13* B. S. BINNEY, 64 Kilby st., Boston.

Union Vise

CO., of Boston, Mass. Pipe & Heavy, warranted. Woodworkers and Covered Screw, 50 sizes and styles constantly on hand. Milling Machines, weighing 2,-300, 1,600, 1,050, 1,000 and 900 lbs.

G. H. NOTT, President.
A. H. BRAINARD, Sup't.
26 tf

CATALOGUES SENT FREE.

MATHEMATICAL INSTRUMENTS, 112 pages.
OPTICAL INSTRUMENTS, 72 pages.
MAGIC LANTERNS and STEREOPTICONS, 100 pp.
PHILOSOPHICAL INSTRUMENTS, 84 pages.

JAMES W. QUEEN & CO.,
13 tf 924 Chestnut st., Philadelphia, Pa.

ANDERSON'S PATENT MULEY SAW Hangings. The oscillating lower Muley and self-adjusting rake upper Muley perform ⅓ more work with ⅓ less power than any other. COE & WILKES, Painesville, Ohio, sole manufacturers, except for the States of Maine and Pennsylvania. Send for circulars. 13 8

$20 a Day to Male and Female Agents to introduce the BUCKEYE $20 SHUTTLE SEWING MACHINES. Stitch alike on both sides, and is the only LICENSED SHUTTLE MACHINE in the market sold for less than $40. All others are infringements, and the seller and user are liable to prosecution and imprisonment. Full particulars free. Address

W. A. HENDERSON & CO.,
25 13 Cleveland, Ohio.

WARD'S PATENT SPOKE MACHINES. The Best in Use. State, County and Town Rights for sale. Also, Machines manufactured by WILLIAM H. LEWIS & CO., at Naugatuck, Conn. Send for circular. 26 10*

PAGE'S GREAT WATER FLAME COAL, Patented Lime Kiln will burn No. 1 finishing lime with any coal or wood, mixed or separate, in same kiln. Rights for sale by C. D. PAGE, Rochester, N. Y. 1 26*

WANTED—AGENTS—$75 to $200 per month, everywhere, male and female, to introduce the GENUINE IMPROVED COMMON-SENSE FAMILY SEWING MACHINE. This Machine will stitch, hem, fell, tuck, quilt, cord, bind, braid, and embroider in a most superior manner. Price only $18. Fully warranted for five years. We will pay $1000 for any machine that will sew a stronger, more beautiful, or more elastic seam than ours. It makes the "Elastic Lock Stitch." Every second stitch can be cut and still the cloth cannot be pulled apart without tearing it. We pay Agents from $75 to $200 per month and expenses, or a commission from which twice that amount can be made. Address SECOMB & CO., Pittsburgh, Pa., Boston, Mass., or St. Louis, Mo.

CAUTION.—Do not be imposed upon by other parties palming off worthless cast-iron machines, under the same name, or otherwise. Ours is the only genuine and really practical cheap machine manufactured. 16 12

WANTED—AGENTS—To sell the AMERICAN KNITTING MACHINE. Price $25. The simplest, cheapest, and best Knitting Machine ever invented. Will knit 20,000 stitches per minute. Liberal inducements to Agents. Address AMERICAN KNITTING MACHINE CO., Boston, Mass., or St. Louis, Mo. 16 12

Oak Tanned Belting

Manufactured by C. W. Arny, 301 Cherry st., Philadelphia. 22 13

R. BALL & CO., Worcester, Mass., Manufacturers of Woodworth's, Daniel's, and Dimension Planers; Molding, Matching, Tenoning, Mortising, Shaping, and Boring Machines; Scroll Saws, Re-sawing, Hand Boring, Wood Turning Lathes and a variety of other Machines for Working Wood. Also, the best Patent Door, Hub, and Rail Car Mortising Machines in the world. ☞ Send for our Illustrated Catalogue.

RICHARD BALL. E. P. HALSTED.
13 tf

THE INVENTOR'S AND MECHANIC'S GUIDE.—A new book upon Mechanics, Patents, and New Inventions. Containing the U. S. Patent Laws, Rules and Directions for doing business at the Patent Office; 112 diagrams of the best mechanical movements, with descriptions; the Condensing Steam Engine, with engraving and description; How to Invent; How to Obtain Patents; Hints upon the Value of Patents; How to sell Patents; Forms for Assignments; Information upon the Rights of Inventors, Assignees and Joint Owners; Instructions as to Interferences, Reissues, Extensions, Caveats, together with a great variety of useful information in regard to patents, new inventions, and scientific subjects, with scientific tables, and many illustrations. 108 pages. This is a most valuable work. Price only 25 cents. Address MUNN & CO., 37 Park Row, N. Y.

WOOD-WORKING MACHINERY.—THE subscriber is the New York Agent for all the Manufacturers, and sells at their prices. 8 tf c E. C. HILLS, 12 Platt street.

NEW MACHINE for Grinding Tools, etc., Great Saving of Files and Labor by their use. Address AMERICAN TWIST DRILL CO., Woonsocket, R.I. 14 eow

L. D. FAY, Manufacturer and Dealer in Machinists' Tools and Woodworking Machinery. Manufactory, Worcester, Mass. Warehouse and Salesroom, St. Louis, Mo. Large variety of Lathes, Lathe Chucks, Engines, Sawmills, etc. Enclose stamp for catalogue. 23 eow

GREAT ECONOMY IN

WATER POWER.

LEFFEL'S DOUBLE TURBINE WATER WHEEL—Best Wheel in Existence.—Manufactured by JAS. LEFFEL & CO., at Springfield, Ohio, and New Haven, Conn.

New Illustrated Pamphlet for 1869 sent free on application. 6 1ostis eow tf

IMPROVED ALUMINUM BRONZE

Hunting Case Watches.

From the Scientific American of April 11, 1868.

"The color of the metal closely resembles that of 18c. gold, is more grateful to the eye and its luster brilliant," etc.

When desired these watches will be sent to any express office, and permission of examination granted upon payment of freight charges.

Description of goods and metal sent free upon application. An inspection of my goods is earnestly solicited.

J. D. HUGUENIN VUILLEMIN,
No. 44 Nassau st., New York
20 eow tf For sale by all respectable dealers.

UNION SALAMANDER WORKS—HORTON & MABIE, Proprietors, Peekskill, N. Y. FIRE BRICKS and STOVE LININGS of every description made to order at the shortest notice. 19 7eow

MERRICK & SONS,

Southwark Foundery,

No. 430 Washington Avenue, Philadelphia.

William Wright's Patent

VARIABLE CUT-OFF STEAM ENGINE,

Regulated by the Governor.

Merrick's SAFETY HOISTING MACHINE,

Patented June, 1868. DAVID JOY'S PATENT

VALVELESS STEAM HAMMER.

D. M. Weston's Patent

Self-Centering, Self-Balancing Centrifugal Sugar-Draining Machine.

AND

HYDRO EXTRACTOR

For Cotton and Woolen Manufacturers.
eow tf New York Office, 62 Broadway

OUR SUPERIOR OROIDE WATCHES having recently been imitated, and worthless Watches sold in New York, Boston, Chicago, and other cities, represented as our Watches, we hereby caution the public against them, and give notice that we are in no way responsible for these bogus concerns, and only those purchasing directly from us can secure a genuine Watch of our manufacture. We have recently greatly improved our Oroide in appearance and durability; and, to protect the public from imposition hereafter, have named it the "COLLINS' METAL," and we give notice that any one making use of this name will be prosecuted to the extent of the law.

This metal has all the brilliancy and durability of Gold; cannot be distinguished from it by the best judges; retains its color till worn out, and is equal to gold excepting in intrinsic value. All our gentlemen's Watches are FULL-JEWELED PATENT LEVERS; those for ladies, an Improved Escapement, better than a Lever for a small Watch; all in Hunting Cases, and fully guaranteed by special certificate. The $15 Watches are equal in neatness, style of finish, general appearance, and for time, to a gold one costing $150. Those of $20 are of EXTRA fine finish, and are fully equal to a gold watch costing $200. Chains of every style, from $2 to $6.

JEWELRY.—We are manufacturing all kinds of Jewelry of the Collins Metal; Pins, Earrings, Sleeve Buttons, Lockets, Studs, Finger Rings, Bracelets, Pencils, Charms, Odd Fellow and Masonic Pins, etc., all of the latest and most elegant styles, and fully equal to gold in appearance and wear.

TO CLUBS.—Where six Watches are ordered at one time, we will send one extra Watch free of charge.

Goods sent to any part of the United States by express, to be paid for on delivery. Money need not be sent with the order, as bills can be paid when goods are taken from the express office. Customers must pay all express charges. We employ no Agents; orders must, therefore be sent directly to us. In ordering, write plainly the name, town, county, and State. Customers in the city will remember that our ONLY OFFICE is

Nos. 37 and 39 Nassau street, opposite the Postoffice (up stairs), New York.

16 13eow C. E. COLLINS & CO.

FOR SALE.—Machinists' Tools, Boilers, etc. One Stand No. 1 Lowell Machine Shop Shaping Machine; 3 Planers; 3 Lathes; 1 Centering Lathe; 1 Boiler Maker's Punch; 1 Shear for Boiler or Smith Shops; 1 Hartford Boiler, 15-H. P.; 3 new Tube Boilers of 4, 5, 8, 15, and 18-H. P.; 1 Improved Ore Crusher; also, Steam Engines, all sizes, making by DENMEAD & SON, Baltimore. 20 3

DESIGNS AND WORKING DRAWINGS of Machinery, etc., promptly made by M. N. FORNEY, Mechanical Engineer, 52 Broadway, Room 22, N. Y. 20 5*

LEE'S PATENT MOLDING MACHINE.

MANUFACTURED BY H. A. LEE, Worcester, Mass. Warerooms with SAMPSON & COPELAND, 42 Cortlandt st., N. Y. 18 tf

Advertisements.

Advertisements will be admitted on this page at the rate of $1.00 per line. Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.

Ball, Black & Co.,

565 and 567 BROADWAY,
MANUFACTURERS OF
ENGLISH STERLING
Silver Ware.

THE FACILITIES OF BALL, BLACK & CO. FOR MANUFACTURING, ENABLE THEM TO OFFER A LARGER VARIETY OF PATTERNS, AND AT LOWER PRICES THAN ANY OTHER HOUSE IN THE TRADE.
14 [illegible]

PATTERN LETTERS to put on Patterns for Castings, etc., KNIGHT BROS., Seneca Falls, N.Y. 1 24*os

TO PATENT OWNERS.—A Capitalist would unite with the owner of any valuable patent and furnish funds to manufacture and push the same. Address SAMUEL OLIVER, Box 250, Brooklyn, N. Y.

W. ZINSSER & CO., 197 William st., N.Y., Manuf'rs of Varnishes, Lackers, White Shellac, Sealing Wax, Cements, etc., & dealers in Manf'd Articles.

FOR SALE—A First-class Iron Planer, nearly New, built by Putnam Machine Co., of Fitchburg, Mass. It is arranged with two Tool Heads, and will plane 3 ft. 4 in. wide, by 3 ft. high, by 17 feet long. Apply to PROVIDENCE TOOL CO. ARMORY, Providence, R. I. 22 3os

Business for Sale.

FOR SALE ON FAVORABLE TERMS—The Stock, Fixtures, Patterns, and Business of the Machinists' Tool Manufactory of the late A. M. Badger, of Rochester, N. Y. The Real Estate will also be sold if desired. There has been no interruption in the business, which continues in a prosperous condition. A personal inspection can be made at any time, as the works are in full operation. Address S. A. BADGER, Administratrix, 2os Nos. 4 & 6 Hill st., Rochester, N. Y.

T. H. McALLISTER'S Compound Household Microscope contains all the essential parts of the higher priced Instruments, with magnifying powers of 400, 1600, 2500, 10,000 times the area, affording opportunity for investigating the minutiae of Animal and Vegetable Life. The Microscope, with 24 interesting Objects of Natural History, $10; without the Objects, $5. Also, First-class Achromatic Microscopes, from $25 to $500. Illustrated Descriptive Price List forwarded to any address. T. H. McALLISTER, Optician,
1os* 49 Nassau st., New York.

THE SPRINGFIELD
GAS MACHINE,

FOR LIGHTING COUNTRY RESIDENCES AND MANUFACTORIES.

These celebrated MACHINES are sold by GILBERT & BARKER, General Agents, No. 50 Crosby st., New York.
(Broadway entrance through Covell & Co.'s, No. 334.)
ILLUSTRATED CIRCULARS, giving full descriptions of the MACHINE, and also testimonials from and reference to some hundred persons who have used them for a number of years, can be had upon application, or will be mailed upon request. 22 1os

UNIVERSAL CLOTHES WRINGER

THE ONLY WRINGER WHICH HAS the Patent Stop, to prevent the cogs from entirely separating.
"It really merits all the good that can be said of it."—Moore's Rural New Yorker.
"The Universal 'the Best'."—Am. Agriculturist.
Sold by dealers generally. R. C. BROWNING,
22 2os Gen'l Ag't, 32 Cortlandt st., New York.

PATENT AIR TREATMENT, immensely benefits Malting, Brewing, Distilling, Winemaking, Baking, the Conserving and Transporting of fruit, all Curing, etc. Pamphlets free. RIGHTS FOR SALE. Also for PERFECT GOLD EXTRACTION BY ZINC. Grooved Wheel R. R. BRAKE, Cord Attachment. Apply to R. d'HEUREUSE, Box 6844, N.Y. 19 os tf

PATENT SOLID EMERY WHEELS, Specially adapted to Grinding Saws, Mills, and Edge Tools. Solid Wheels for Brass Work, warranted not to Glaze. Also, Patent Emery Oil and Slip Stones, the best article in use for Planer Knives, Carpenters' Tools, and for Finishing Down Iron Work. NORTHAMPTON EMERY WHEEL CO., Leeds, Mass. 6 tf os

London.......................48 Cannon street.

H. KOHNSTAMM,
Manufacturer of
ULTRAMARINE,

And Importer of English, French, and German Colors, Paints, and Artists' Materials, Bronzes, and Metals. No. 3 Tryon Row, New York, opposite City Hall. 15 13os*

For Sale,

A BEAM STEAM ENGINE, with Cylinder 24 in. diam. by 48 in. stroke, with 1 vacuum pumps, 20 in. diam. by 24 in. stroke and 2 water pumps, 7 in. diam. by 24 in. stroke. The Engine is a very good and substantial one, built by the Novelty Iron Works, and is now working in a Sugar Refinery, where it can be seen. It can be used both as a high or low-pressure engine, and is suitable for any Mill or Factory. For particulars address A. & F. BROWN, 57, 59 and 61 Lewis st., New York. 15 os tf

WM. D. ANDREWS & BROTHER,
414 Water st., New York, Manufacture
Patent Smoke-burning & Superheating Boilers that are safe. DRAINAGE and WRECKING PUMPS, to pass large bodies of Water, Sand, and Gravel. HOISTING MACHINES, Friction Grooved and Noiseless, or with Gearing. OSCILLATING ENGINES from half to two hundred and fifty-horse power. All of these Machines are Light, Compact, Durable, and Economical. 1 tfos

It is not generally known that Genuine Waltham Watches are sold in New York at lower prices than in any other part of the country. We send single Watches by Express to any place, however remote, at the reduced prices, and we give the purchaser the privilege of examining the Watch before paying. Silver Hunting Watches, $18; Gold Hunting Watches, $70. Every Watch warranted by a special Certificate. Our descriptive Price List gives full information in regard to the different kinds and our manner of sending them by Express. We send it to any one, post paid, on application. When you write, please state in what Paper you saw this notice. Address in full, HOWARD & CO., Jewelers and Silversmiths, No. 619 Broadway, New York.

WOODWARD'S
NATIONAL
ARCHITECT.
A practical work just finished, containing 1000 Designs, Plans and Details to Working Scale of Country, Suburban, and Village Houses, with Specifications and estimate of cost. Quarto. PRICE Twelve Dollars, postpaid.

WOODWARD'S COUNTRY HOMES.
150 Designs, $1 50, postpaid.
GEO. E. WOODWARD, Architect,
191 Broadway,
New York.
Send stamp for catalogue of all new books on Architecture.
18 os tf

BOILERS of all kinds constantly on hand at very low prices for cash.
HAMPSON & COPELAND, 21 Cortlandt st., New York.
19 4os

CIRCULAR SAWS.

THESE SAWS HAVE been manufactured and in use since 1861. They are Warranted the

Best Inserted Tooth Saws

made. Are used exclusively on the Pacific Coast, and are approved by Mill men wherever known.
Manufactured and For sale by

N. W. SPAULDING & BROTHERS,
25 N. Clinton st., bet. Randolph & Lake.

BRANCH, CROOKES & CO.,
314 Lake st., Chicago, Ill.

BRANCH, CROOKES & CO.,
118 and 120 Vine st., St. Louis, Mo.

BRANCH, CROOKES & CO.,
75 Carondelet st., New Orleans, La.

N. W. SPAULDING,
Patentee, San Francisco, Cal.

☞ CAUTION.—All persons not purchasing from us are hereby cautioned against using or vending detachable or inserted teeth, the recesses or sockets for which are made on circular saws, as all saws so manufactured are an infringement of

N. W. Spaulding's Patent,

and parties offending will be prosecuted according to law. 20 os 26

FOR ALL LIGHT WORK
ERICSSON'S
Caloric Engine

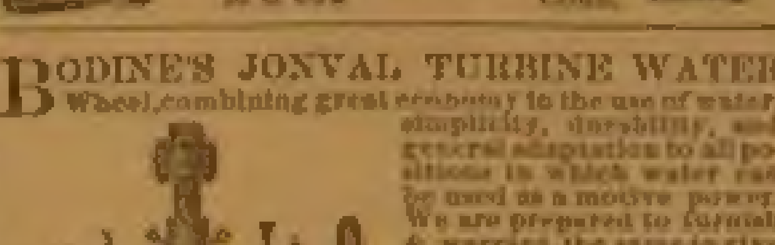
FURNISHES THE MOST
ECONOMICAL, DURABLE, RELIABLE POWER.
GREATLY IMPROVED AND REDUCED IN PRICE.
16 os tf JAMES A. ROBINSON, 164 Duane st., N. Y.

B. F. STURTEVANT'S
NEW PATENT IMPROVED
FAN
PRESSURE BLOWERS
MANUFACTORY & SALESROOM
72 SUDBURY ST. BOSTON.

IRON PLANERS, ENGINE LATHES, Drills, and other Machinists' Tools, of Superior Quality, on hand and finishing. For sale Low. For Description and Price, address NEW HAVEN MANUFACTURING CO., New Haven. 5 tf os

Root's Wrought Iron Sectional
Safety Boiler.

OVER 100 SOLD—TESTED TO 300 lbs., no large sheet-iron shell to explode. Economical and Durable. All sizes on hand. Also, Steam Engines, Steam Pumps, etc. Send for Pamphlets and Price Lists.
JOHN B. ROOT,
13 13os 95 and 97 Liberty st., New York.



LECOUNT'S PATENT HOLLOW LATHE DOGS AND CLAMPS.—A set of 8 Dogs from ⅜ to 2-in., inclusive, $8. A set of 12 from ⅜ to 4-in., $17.50. Five sizes Machinists' Clamps, from 2 to 6-in., inclusive, $11. Send for Circular.
C. W. LECOUNT,
South Norwalk,
26 tf eow Conn.

BODINE'S JONVAL TURBINE WATER Wheel, combining great economy in the use of water, simplicity, durability, and general adaptation to all positions in which water can be used as a motive power. We are prepared to furnish & warrant the same to give more power than any overshot or other turbine wheel made, using the same amount of water. Agents wanted. Send for descriptive circular.

BODINE & CO.,
Manuf's, Mount Morris, N. York, and Westfield, Mass.
18 os tf eow

Niles Tool Works,

CINCINNATI, OHIO,
Have on hand, two 44-inch Iron Planers; two Radial Drills; four Upright Column Drills; six 26-inch swing Engine Lathes. 20 5os

Reynolds'
Turbine Water Wheels.

No Complex, Duplex, or Triplex complications. All such are costly, perishable, easily clogged, inaccessible. Mill Gearing, Shafting and Pulleys. Send for Illustrated Pamphlet.
GEORGE TALLCOT,
96 Liberty st., New York.
15 tf *os

WIRE ROPE.

Manufactured by
JOHN A. ROEBLING,
Trenton N. J.

FOR Inclined Planes, Standing Ship Rigging, Bridges, Ferries, Stays or Guys on Derricks & Cranes, Tiller Ropes, Sash Cords of Copper and Iron, Lightning Conductors of Copper. Special attention given to hoisting rope of all kinds for Mines and Elevators. Apply for circular, giving price and other information.
os 1tf

WATER WHEELS.

STEVENSON'S
Duplex Turbine,

NOT Equaled by any wheel in existence.—Great economy of water. The only wheel suitable to variable streams. Illustrated Pamphlet with Useful Tables sent free. J. E. STEVENSON,
21 13os 83 Liberty st., New York.

MECHANICAL DESIGNERS ENGRAVERS ON WOOD.

KNAPP & CO.,
8 and 10 John St., N. Y.

ASBESTOS.

This wonderful mineral differs from all others in possessing fine, silk-like fibers, which are indestructible by fire.

ASBESTOS ROOFING
Is a CHEAP and RELIABLE substitute for Slate, Tin etc., adapted for all climates, and can be easily applied.

ASBESTOS ROOF COATING
Is a fibrous, water-proof coating for preserving Tin Shingle, Canvas, and Felt Roofs. Prepared ready for use.

ASBESTOS CEMENT
Is a fibrous material, to be applied with a trowel, for repairing leaks around Chimneys, Dormer Windows, etc.

ASBESTOS SHEATHING FELT
For use under Slate, Shingles, etc., and under Weather Boards, in place of filling in with brick.

DESCRIPTIVE CIRCULARS,
Prices and any further desired information will be furnished free by mail on application to

H. W. JOHNS, Patentee,
Manufacturer of Improved Roofing Materials, Preservative and Fire-proof Paints, Boiler Felting, etc.
78 WILLIAM ST., NEW YORK.
9 os tf

FREE.—Our New Catalogue of Improved STENCIL DIES. More than $200 A MONTH is being made with them S. M. SPENCER & CO., Brattleboro Vt.
5 12os

Power Hammers.

HOTCHKISS' PAT. Air Spring Hammers;
W. H. WATER'S PAT. Drop Hammers.
These SUPERIOR TOOLS made by CHARLES MERRILL & SONS, 556 Grand st., New York.
2

FOR LINSEED AND COTTON-SEED OIL Machinery address W. P. CALLAHAN, Dayton, O.
18 3*

Bridesburg Manf'g Co.,

OFFICE No. 65 NORTH FRONT STREET,
PHILADELPHIA, PA.,
Manufacture all kinds of Cotton and Woolen Machinery including their new
SELF-ACTING MULES AND LOOMS,
Of the most approved style. Plans drawn and estimates furnished for factories of any size. Shafting and mill gearing made to order. 13 tf

VELOCIPEDES.

FOR A NICE SPRING MACHINE, particularly adapted for out-door use fully licensed under the Smith and Witty Lallement patents, address
20 tf EXETER MACHINE WORKS, Exeter, N. H.

Philadelphia Advertisements.

☞ Philadelphia Advertising Patrons, who prefer it, can have their orders forwarded through T. V. Carpenter, resident Agent, 1506 Poplar st.

The Harrison Boiler.

THIS IS THE ONLY REALLY SAFE BOILER in the market, and can now be furnished at a *GREATLY REDUCED COST.* Boilers of any size ready for delivery. For circulars, plans, etc., apply to

HARRISON BOILER WORKS,
Philadelphia, Pa.; J. B. Hyde, Agent, 119 Broadway, New York; or to JOHN A. COLEMAN, Agent, 53 Kilby st., Boston, Mass. 19 tf os

SAWS. EVERY DESCRIPTION Guaranteed under a forfeiture of $500, to cut the most lumber with the least expense.

Henry Disston & Son,

PHILADELPHIA. Special attention paid to our new style Circular, Belt, Cross-cut, Mill, and Buck Saws. Orders received from England, Ireland, and the Continent.
22 13os

2d-Hand Machinery,

TO Close out Machine and Boiler Shop,—12 Lathes, 12 to 30in. swing; 3 Iron Planers; 5 Bolt Cutters; 1 Heavy Shaper, or Compound Planer made by "Bettz, Pusey & Co."; 1 heavy Punch and Shears; one "Hart's" Boiler Punch; 1 Suspension Drill; 1 40-Horse Engine; Shafting, Pulleys, etc. Address CHARLES H. SMITH, 135 North 3d st., Philadelphia. 21 4os

American OIL FEEDER,

FOR JOURNALS OF MACHINERY.
Pronounced the
BEST SYSTEM.
Detects friction and gives no drip. Saves 75 per cent. Send for circular.
J. E. [illegible],
20 1os 145 South Front st., Philadelphia.

Drawing Materials.

WHATMAN'S PAPERS.—White and Yellow Drawing Paper, 40 and 54 inches wide. Tracing Muslin, Tracing Paper, Muslin-backed Drawing Paper, 38 and 54 inches wide. Winsor & Newton's Colors, India Ink. Faber's Drawing Pencils, etc., etc. Priced Catalogues sent free. JAS. W. QUEEN & CO.,
19 os tf 924 Chestnut st., Philadelphia.

Factory, Trenton, N. J.—Office, No. 2 Jacob st., N. Y.
☞ Branch Office for Pacific Coast, No. 606 Front st., San Francisco, Cal. 17 os tf

INCREASE TWIST DRILLS, FLUTED HAND REAMERS, exact to Whitworth's Gage, and Beach's Patent Self-centering Chuck, manufactured by Morse Twist Drill and Machine Co., New Bedford, Mass.
1 26os

MECHANICS

WILL FIND THE
Scientific American
The Best Paper for Them Now Published

It is the most Popular Journal in the world, devoted to Invention, Mechanics, Manufactures, Art, Science, and General Industry.

THE SCIENTIFIC AMERICAN

Has been Published for nearly a quarter of a Century and has a larger circulation than all other papers of its class in this country and in Europe. Every number is illuminated with

Superb Illustrations

by our own artists, of all the best inventions of the day and descriptions and illustrations of

LEADING MANUFACTURING ESTABLISHMENTS, MACHINES, TOOLS AND PROCESSES.

Inventors and Patentees

will find in each number an official List of Patents, together with descriptions of the more important inventions, with decisions in Patent Cases and points of law affecting the rights and interests of Patentees.

TERMS OF SUBSCRIPTION:—$3.00 a year, $1.50 for six months. $1 for four months.
To clubs of ten and upward, the subscription is only $2.50 per annum each.
Specimen copies will be sent gratis.
MUNN & CO., Publishers,
37 Park Row, New York.

TO INVENTORS

THOSE WISHING to secure their rights by Letters Patent

Are referred to an advertisement on another page.

An Illustrated Pamphlet containing the Patent Laws, and full particulars concerning the obtaining of Patents, will be mailed free on application. Also, a Pamphlet relative to Foreign Patents and their cost furnished free.

Address
MUNN & CO., Patent Solicitors,
37 Park Row New York.